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Australian Personal Computer

VOL. 22 NO. 8 AUGUST 2001

WIRELESS NETWORKING

ISSN - 0725-4415 Print Post Approved PPS500300559



# OFFICE SYSTEMS TO TAKE ON ALL WORK CHALLENGES



## Hot Business Value Bundle

### Dimension™ 4100 Desktop

- Intel® Pentium® III Processor 1GHz
- Intel® 815e Chipset
- 20GB<sup>1</sup> HDD
- 128MB 133MHz SDRAM ■ 3.5" FDD
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- Creative Labs SoundBlaster 64Voice PCI Sound Card
- 48X Max CD-ROM
- 15" Colour Monitor (13.8" v.i.s.)
- Norton Anti-Virus 2001 - OEM



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All Dell Dimension™ 4100 desktops featured in this advertisement are shown with optional 17" Trinitron flat display monitors.



### Power Business Bundle 8100

#### DIMENSION™ 8100 DESKTOP

- Intel® Pentium® 4 Processor 1.3GHz
- Intel® 850 Chipset ■ 3.5" FDD
- 128MB RDRAM ■ 10GB<sup>1</sup> HDD
- 48X Max CD-ROM
- 32MB nVidia GeForce2 MX AGP Graphics Card
- 15" Colour Monitor (13.8" v.i.s.)
- Norton Anti-Virus 2001 - OEM



### Business Value Solution 4000

#### INSPIRON™ 4000 G700GT NOTEBOOK

- Mobile Intel® Pentium® III Processor 700Mhz featuring Intel® Speedstep™ technology
- 128MB SDRAM
- 6GB<sup>1</sup> HDD ■ 3.5" FDD
- 8MB AGP 2X ATI RAGE MOBILITY 128" 3D Video
- 3D Positional Sound with Wavetable
- 24X Max CD-ROM
- 14.1" XGA TFT Display (1024x768 res)



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#### POWEREDGE™ 300SC SERVER

- Intel® Pentium® III Processor 800MHz (Dual Processor Capable) ■ Minitor
- 256KB Internal L2 Cache/100MHz
- 64MB 100MHz SDRAM With ECC (Upgradeable to 1GB)
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All Dell™ Dimension™ and Inspiron™ products featured on this page come with: 1 Year Internet Access with OzEmail<sup>1</sup>, Microsoft® Windows® Millennium Edition, Microsoft® OEM Works Suite 2001, 1-Year Limited Warranty (1 Year Next Business Day On-site<sup>2</sup> Service and 1 Year Parts) for Dell™ Inspiron™ notebooks; 1-Year Limited Warranty (1 Year Second Business Day On-site<sup>2</sup> Service and 1 Year Parts) for Dell™ Dimension desktops.

### Dimension™ Upgrades

Upgrade from 128MB to 256MB SDRAM (2x128) **\$368\*** Upgrade from 20GB<sup>1</sup> to 40GB<sup>1</sup> Hard Drive **\$108\***  
 Upgrade from CD-ROM to DVD-ROM **\$119\*** Upgrade from 15" to 17" Monitor (15" v.i.s.) **\$216\***  
 Add 10/100 NIC **\$141\*** Add 56k Modem **\$113\***

### Inspiron™ Upgrades

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## ENTERTAINMENT PACKAGES WITH POWER TO BURN



All Dell™ Dimension™ 8100 desktops featured in this advertisement are shown with optional 19" Trinitron flat display monitors.

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#### Dimension™ Desktop 8100

- Intel® Pentium® 4 Processor 1.3GHz ■ 3.5" FDD
- Intel® 850 Chipset ■ 20GB¹ HDD ■ PC Stereo Speakers
- 128MB RDRAM ■ 16X Max DVD-ROM
- 32MB nVidia GeForce2 MX AGP Graphics Card
- SoundBlaster Live! Value 576Voice Sound Card
- 17" Colour Monitor (15.9"v.i.s.)
- Norton Anti-Virus 2001 - OEM
- 56K Modem ■ Enthusiast Game Pack

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### Value Gaming Package **4100**

#### DIMENSION™ 4100 DESKTOP

- Intel® Pentium® III Processor 1GHz
- 20GB¹ HDD ■ Intel® 815e Chipset ■ 3.5" FDD
- 128MB 133MHz SDRAM ■ PC Stereo Speakers
- 32MB nVidia GeForce2 MX AGP Graphics Card
- Creative Labs SoundBlaster 64Voice PCI Sound Card
- 48X Max CD-ROM ■ PowerGame Pack II
- 15" Colour Monitor (13.8"v.i.s.)
- Norton Anti-Virus 2001 - OEM

► **PLUS Your Choice of 1 Dimension™ FREE Bonus\***

<b>\$1,999*</b> <small>VALID TILL 3/08/01 PRICE INCLUDES GST. DELIVERY ADDITIONAL</small>	<b>\$14.55**</b> <small>PER WEEK Consumer loan. Conditions apply.</small>
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### All You Need Bundle **8000**

#### INSPIRON™ 8000 G850VT NOTEBOOK

- Mobile Intel® Pentium® III Processor 850MHz
- 128MB SDRAM ■ 10GB¹ HDD ■ 3.5" FDD
- 32MB DDR 4X AGP NVIDIA® GeForce2 Go™
- 3D Video ■ 24X Max CD-ROM ■ Carry Case
- 3D Positional Sound with Wavetable
- Harman/Kardon® Odyssey® 2 Speakers (Internal)
- 15" Super XGA+ TFT Display (1400x1050 res)
- Internal Mini-PCI 56K Capable Fax Modem

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### Ultimate Power Package **8000**

#### INSPIRON™ 8000 G1000U NOTEBOOK

- Mobile Intel® Pentium® III Processor 1GHz ■ 3.5" FDD
- 128MB SDRAM ■ 20GB¹ HDD ■ 24X Max CD-ROM
- 32MB DDR 4X AGP NVIDIA® GeForce2 Go™
- 3D Video ■ 3D Positional Sound with Wavetable
- Harman/Kardon® Odyssey® 2 Speakers (Internal)
- 15" Ultra XGA TFT Display (1600x1200 res)
- Internal Mini-PCI 56K Capable Fax Modem
- Carry Case

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### Dimension™ FREE Bonuses⁴

At Dell™, you get to choose how your system is put together. For any Dimension™ system featured in home entertainment or home work you also get to choose a free bonus¹ peripheral pictured here. But please note, these offers do not apply to systems on the Dell™ office page.



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**Desktops and notebooks:** If you can find a lower price for an IBM, COMPAQ, HP, TOSHIBA or GATEWAY desktop or notebook of the same

specification and configuration as a Dimension™ or Inspiron™ currently available and quoted by Dell™ we will better that price by \$50\*.



### Dell™ Dimension™ Desktop 8100

with Intel® Pentium® 4 Processor 1.3GHz shown with optional 19" Trinitron flat display monitor.



### Dell™ Inspiron™ 4000 G850X Notebook

with Mobile Intel® Pentium® III Processor 850MHz featuring Intel® Speedstep™ technology. Pictured with optional colour kit.

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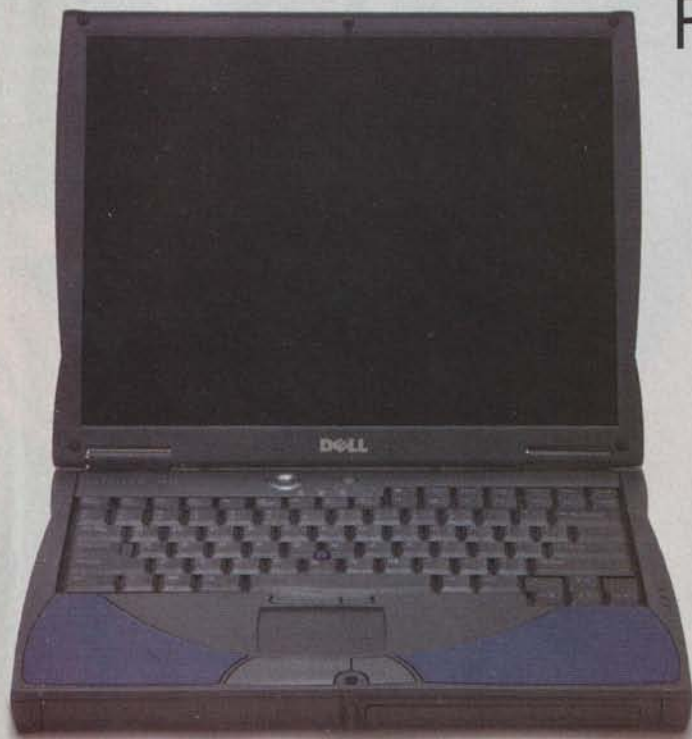


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## HOME SYSTEMS TO HANDLE ANY PRICE CHALLENGES



Dell Inspiron™ 4000 shown with optional colour kit.

### Notebook Value Solution

#### Inspiron™ 4000 G850X Notebook

- Mobile Intel® Pentium® III Processor 850MHz featuring Intel® Speedstep™ technology
- 128MB SDRAM ■ 10GB¹ HDD
- 8MB AGP 2X ATI RAGE MOBILITY 128™ 3D Video
- 24X Max CD-ROM
- Carry Case ■ 3.5" FDD
- 3D Positional Sound with Wavetable
- 14.1" Super XGA+ Display (1400x1050 res)
- Internal Mini-PCI 56K Capable Fax Modem



➤ **PLUS Your Choice of 1 Inspiron™ FREE Bonus⁴**

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PRICE INCLUDES GST. DELIVERY ADDITIONAL

**\$24.75**  
PER WEEK

Consumer loan.  
Conditions apply.



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### Value Multimedia Solution

**4100**

#### DIMENSION™ 4100 DESKTOP

- Intel® Pentium® III Processor 933MHz
- 20GB¹ HDD ■ Intel® 815e Chipset ■ 3.5" FDD
- 128MB 133MHz SDRAM ■ PC Stereo Speakers
- 16MB ATI RAGE 128 Pro 4X AGP Graphics Card
- SoundBlaster Live! Value 576Voice Sound Card
- 48X Max CD-ROM ■ 56K Modem
- 15" Colour Monitor (13.8" v.i.s.)
- Norton Anti-Virus 2001 - OEM

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### My First Notebook Package

**2500**

#### INSPIRON™ 2500 C700ST NOTEBOOK

- Mobile Intel® Celeron™ Processor 700MHz
- 10GB¹ HDD ■ 64MB SDRAM ■ 3.5" FDD
- 24X Max CD-ROM ■ Carry Case
- Intel® Integrated 3D AGP graphics with up to 8.0MB shared system memory
- Sound Blaster compatible Audio
- 12.1" SVGA TFT Display (800x600 res)
- Internal Mini-PCI 56K Capable Fax Modem

➤ **PLUS Your Choice of 1 Inspiron™ FREE Bonus⁴**

**\$2,799\***

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PRICE INCLUDES GST. DELIVERY ADDITIONAL

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**L-SERIES**

#### DIMENSION™ L DESKTOP

- Intel® Celeron™ Processor 700MHz
- 128MB PC100 Shared SDRAM ■ 3.5" FDD
- 20GB¹ HDD ■ PC Stereo Speakers
- Intel® 3D Direct AGP Graphics
- Creative Labs SoundBlaster 64Voice PCI Sound Card
- 48X Max CD-ROM ■ 56K Modem
- 15" Colour Monitor (13.8" v.i.s.)
- Norton Anti-Virus 2001 - OEM

➤ **PLUS Your Choice of 1 Dimension™ FREE Bonus⁴**

**\$1,499\***

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### Inspiron™ FREE Bonuses⁴

At Dell™, you get to choose how your system is put together. For any Inspiron™ system featured in home entertainment or home work you also get to choose a free bonus¹ peripheral pictured here. But please note, these offers do not apply to systems on the Dell™ office page.



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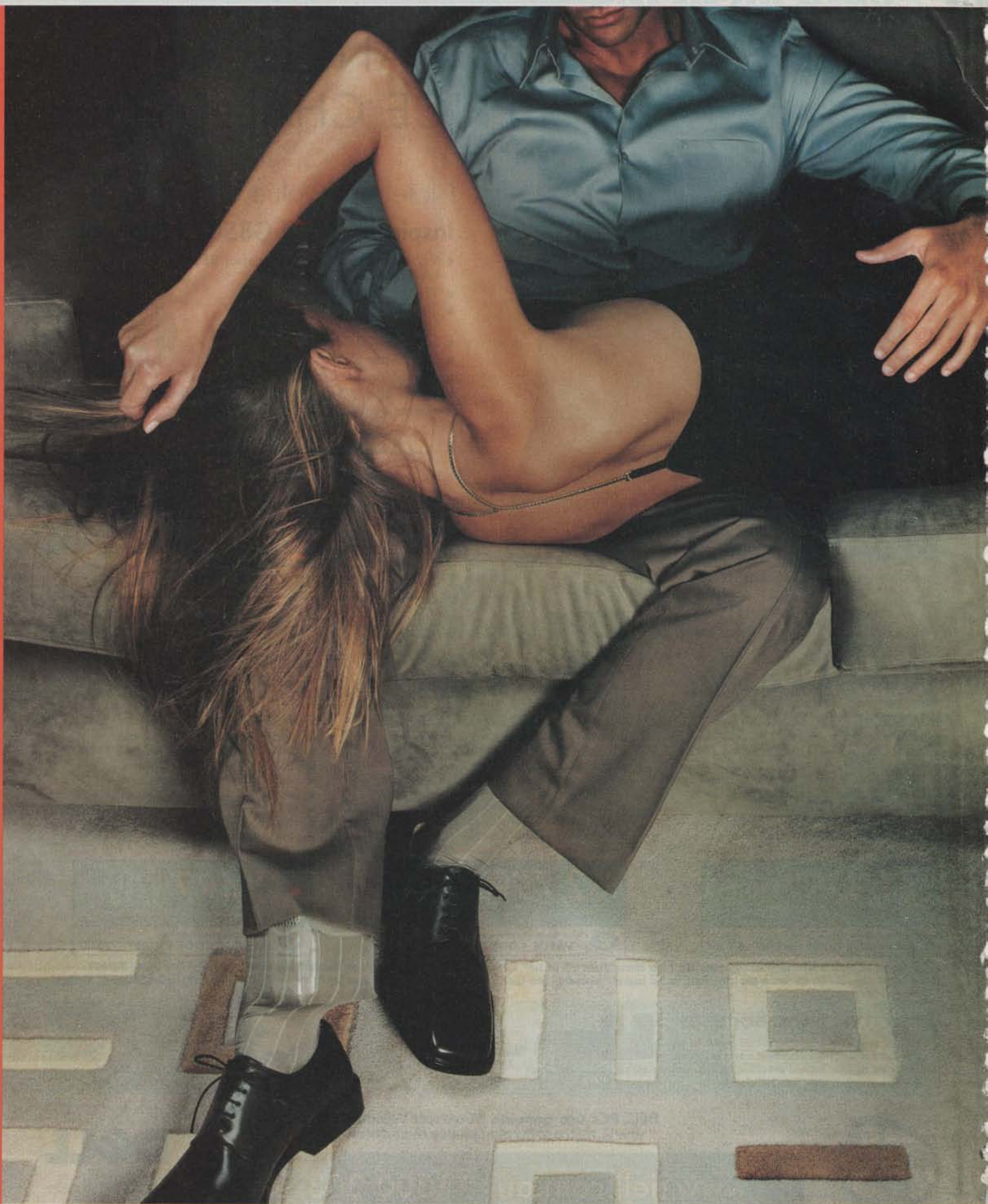
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- 48x CD Drive
- Soundblaster™ Audio PCI 128D
- GCS 300 Speakers
- 56K Data/Fax/Voice Modem
- Norton Anti-Virus
- Microsoft® Windows Me<sup>3</sup>
- Microsoft® Works Suite 2001<sup>3</sup>
- Gateway™ 1 Year Desktop Warranty



Gateway™ Performance 1700.  
Ultimate Speed.

**\$2,999<sup>1</sup>**

Plus \$82.50 delivery<sup>2</sup>

- Intel® Pentium® 4 Processor 1700MHz
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- 20GB Ultra ATA Hard Drive
- EV700 17" Monitor (15.9" Viewable)
- 32MB TNT2 Video Card
- 48x CD Drive
- Sound Blaster™ Audio PCI 128D
- GCS 300 Speakers
- 56K Data/Fax/Voice Modem
- Norton Anti-Virus
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Gateway™ Profile 3.  
Space Saving Advanced PC.

**\$3,299<sup>1</sup>**

Plus \$82.50 delivery<sup>2</sup>

- 15" Flat Panel Display
- Intel® Pentium® III Processor 933MHz
- 128MB SDRAM
- 20GB Hard Drive
- 8x DVD Drive
- Integrated Intel® 3D Video
- Integrated 10/100 Network Card
- Integrated Sound
- Integrated 56K Data/Fax/Voice Modem
- Microsoft® Windows Me<sup>3</sup>
- Microsoft® Works Suite 2001<sup>3</sup>
- Gateway™ 1 Year Desktop Warranty



Gateway™ Performance 1400XL.  
Ultimate Power.

**\$3,999<sup>1</sup>**

Plus \$82.50 delivery<sup>2</sup>

- Intel® Pentium® 4 Processor 1400MHz
- 256MB PC-800 RDRAM
- 20GB Ultra ATA Hard Drive
- VX720 17" Monitor (16" Viewable)
- 64MB GeForce 3 Card
- 16x DVD Drive
- Soundblaster™ Live! Value
- BA 735 Speakers
- 56k Data/Voice/Fax Modem
- Norton Anti-Virus
- Microsoft® Windows Me<sup>3</sup>
- Microsoft® Works Suite 2001<sup>3</sup>
- Gateway™ 1 Year Desktop Warranty

Gateway PCs use genuine Microsoft® Windows®  
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- Intel® Celeron™ Processor 700MHz
- 128MB SDRAM
- 10GB Ultra ATA Hard Drive
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- 1.44MB Floppy Disk Drive
- 24x CD Drive
- 16-bit Stereo Sound & Internal Speakers
- Integrated 56K Data/Fax Modem
- 2 Type II or 1 Type III PCMCIA Slot
- Norton Anti-Virus
- Microsoft® Windows Me<sup>3</sup>
- Microsoft® Works Suite 2001<sup>3</sup>
- Gateway™ 1 Year Notebook Warranty



Gateway™ Solo 3450XL.  
Ultra Light.

**CALL FOR  
TODAY'S BEST PRICE**

Plus \$55 delivery<sup>2</sup>

- 12.1" Active Matrix Display
- Intel® Pentium® III Processor 750MHz
- 256MB SDRAM
- 20GB Ultra ATA Hard Drive
- UMA up to 32MB
- CDRW-DVD Combo Drive
- 1.44MB Floppy Disk Drive
- 16-bit Stereo Sound & Internal Speakers
- Integrated 56K Data/Fax Modem
- 2 Type II or 1 Type III PCMCIA Slot
- Norton Anti-Virus
- Microsoft® Windows Me<sup>3</sup>
- Microsoft® Works Suite 2001<sup>3</sup>
- Gateway™ 1 Year Notebook Warranty

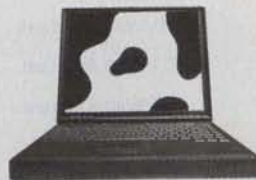


Gateway™ Solo 5300XL.  
Portable Office.

**\$3,299<sup>1</sup>**

Plus \$55 delivery<sup>2</sup>

- 14.1" Active Matrix Display
- Intel® Pentium® III Processor 650MHz
- 64MB SDRAM
- 6GB Ultra ATA Hard Drive
- 8MB S3 Savage AGP Graphics
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- 16-bit Stereo Sound & Internal Speakers
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**David Flynn**

David Flynn can be contacted at  
apc@acptech.net.

At APC, we get to use the technology  
that we write about.

## Walking the talk

**T**hink of something you like — no, something you *love* — to do. Something you're really passionate about. Now imagine being paid to do it.

That's how I respond when friends ask me what it's like to work at APC magazine. And it's the same for all the journalists here. We're passionate about technology and the positive ways in which it shapes our lives. Equally importantly, we use the technology we're writing about.

For instance, we had plenty of fun getting to know DivX;-) for this month's feature. We believe that DivX;-) could be to video and DVD what MP3 is to music and CD — a next-generation distribution medium the studios can't afford to ignore.

We also took the chance to download and distribute BMW's excellent series of short films from the Web using Iomega's Peerless drive (reviewed on page 27). The consensus is that Guy Ritchie's heart-stopping *Star* is the best, but go to [www.bmwfilms.com](http://www.bmwfilms.com) and judge for yourself.

We're all pretty keen on USB (IBM's 8M USB Memory Key is APC's gadget *du jour*), but we are less enthusiastic about PCs that relegate USB ports to the rear panel amid the clutter of cables and cords. This month, we tested two uber-desktops from Gateway: the 1.7GHz Pentium 4 and the 1.3GHz AMD Athlon (see page 24) — and the inclusion of USB and FireWire sockets on the front panel of both boxes, adjacent to the disk drives, brought a smile to our faces. Gateway is far from the first PC vendor to do so (if I recall correctly, that honour fell to Compaq some three years ago), but it's such a simple and sensible decision.

USB and FireWire favour devices which are likely to be hooked up to the PC for relatively short periods: digital cameras, MP3 players, DV camcorders and portable storage drives. And people don't generally want to go poking around the rear of their PCs. It

doesn't require a degree in rocket science to work out that USB and FireWire ports should be easily accessible from where the user sits.

Meanwhile, our feature on wireless networking (page 104) afforded us the opportunity to play with the latest crop of 802.11b WiFi kits, and we soon realised that not every office building is a wireless-friendly zone. If you intend to cut the networking cables in your workplace, start by assessing the signal soak across every square metre. You're almost certain to find 'dead zones' suitable only for filing cabinets or the coffee percolator, unless you install range-boosting WiFi repeater stations.

I also had the opportunity to visit Microsoft's new Australian headquarters and was pleased to see that The Big M is walking the wireless talk: the open-plan building is book-ended by wireless transponders so that it's possible to hook up from almost anywhere, including the cafeteria and the outdoor courtyard.

All this wireless activity inspired me to try 802.11 at home, as a way of linking my notebook to the desktop and, through this, to the cable Internet link. My townhouse has solid concrete walls which would have made a costly nightmare of networking, but wireless made it a very simple procedure. Now I can relax in the courtyard with my notebook, grab files from the desktop, indulge in instant messaging and surf at cable speed.

Our experiences with Bluetooth were less thrilling. The allegedly straightforward task of getting two notebooks with Bluetooth cards to recognise each other was less automatic than problematic, and even at close quarters the signal was erratic. This was disappointing, but it doesn't mean that Bluetooth is heading for a dead end. Despite the fanfare made by the vendors, it's still very early days — right now, Bluetooth might be better named Baby Teeth. But it's one to watch as we step into the wireless world. ■

USB and FireWire  
ports should be  
easily accessible  
from where the  
user sits.



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- 200 Chip Chat  
You've got the mug and the TV spin-off; now it's time to make the movie.

## Cutting the cord

Wireless networking is all the rage, especially for home and business networks. With connection speeds rising and prices falling, is it time to pull the plug? APC looks at your options.



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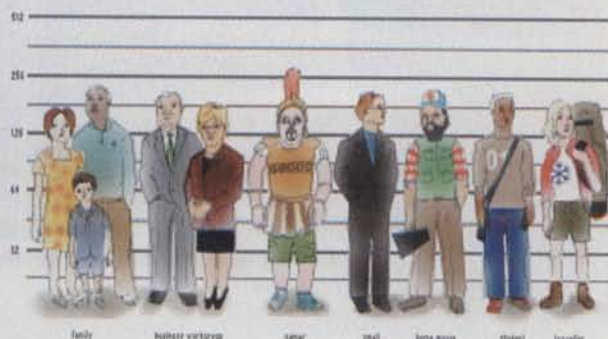
## Best of show

This year's TechX NY technology expo showcased a multitude of exciting new products. APC tears itself away from New York to bring you the latest news on portable devices, DVD writers and LCD screens.

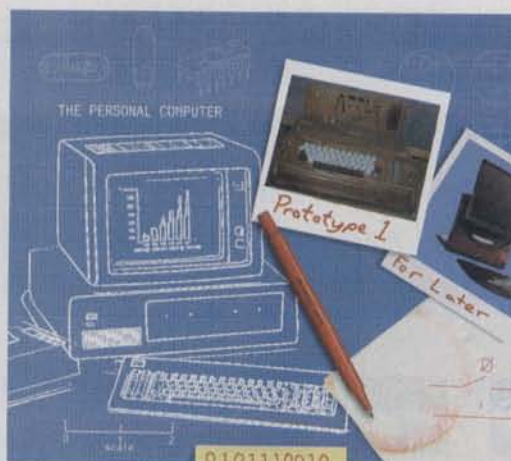
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## The PC guru cheat sheet

What do you do when your friends, family and workmates ask you for advice on what sort of computer they should buy? APC uncovers the best and safest bets for all computer needs.



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## SPECIAL FEATURE: 20 years of the personal computer

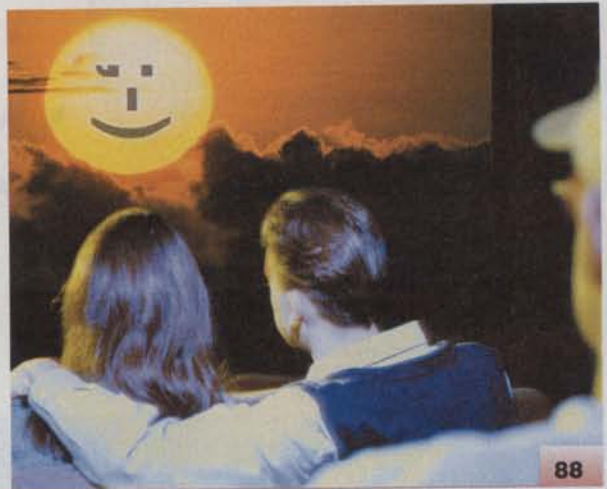
Twenty years ago this month, the PC was launched and our lives changed forever. APC looks back on two decades of personal computing.

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## Dawn of DivX;-)

Fledgling video codec DivX;-) is gaining a dedicated — albeit illegal — following among those committed to trading movies online. Will DivX;-) be to DVD what MP3 is to CD?



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## Give us back our bandwidth!

Disillusioned Telstra subscribers are keen to let you know about their disappointing broadband experiences.

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## External Zip drives

Despite the many attractions of CD-R, Zip drives and disks are still selling like hotcakes. APC put a number of Zip drive retailers to the test to evaluate the quality of their service and advice.



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## Hot technology hits the PC world

APC rounds up the new technologies making waves at computer trade shows and conferences around the world.

Also in News: Australia's financial watchdog warns Net bankers that their money could be at risk from account aggregation; and pressure mounts for DVD zoning to be scrapped.



In News 14

## AMD's technical knockout

We benchmark the Pentium 4 and AMD Athlon side by side to discover which is the best chip.

Also in First Take: reviews of the Sony Vaio, Netscape 6.1, Apple DVD Studio and Iomega Peerless.



In First Take 24



## Does teleworking really work?

Inexpensive broadband connections and wireless data services are making working outside the office more attractive. But how well does it work in practice? APC examines the reality of teleworking.

Also in Corporate IT: get up to speed on the newest trends in business intelligence software, and discover the best way to update your MCSE certification.

In Corporate IT 116





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- FrontPage 98 & 2000 extensions
- Remote control panel via web interface
- Full graphical site statistics
- 1 GB of transfers per month

MORE SPACE!

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- Unlimited email addresses forwarding to multiple destinations
- *imail* (web mail)
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- Own CGI-BIN
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- FrontPage 98 & 2000 extensions
- Remote control panel via web interface
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## Comparisons with other web hosters as taken from their websites on 24 April 2001

Domain name costs are for 2 years and include GST-

Company	ilisys	Ozemail	Web Central	Net Registry	Telstra
.com .net .org	\$40	\$66	\$66	\$110-\$137.50	Not Offered
.com.au	\$110	\$135	\$135	\$140	\$330

## Entry-level domain hosting packages (lowest price domain hosting packages detailed on each company's web page on 24/04/01)

Company	ilisys	ilisys	Ozemail	Web Central	Net Registry
Hosting package	lite	basic	Economy	Economy	Promoter
Server space	5MB	20MB	20MB	20MB	35MB
Monthly transfers	500MB	1 GB	500 MB	500 MB	1 GB
Domain name .com	\$40	\$40	\$66	\$66	\$110
	for 2 years	for 2 years	for 2 years	for 2 years	for 2 years
Set up fee	0	0	\$64	\$64	\$108.90
Cost of basic package	\$120	\$199	\$420	\$420	\$382.80
Total including GST.	\$160	\$239	\$550	\$550	\$601.70

Specifications vary from package to package

## Naming Authority Fees

>> Global domains \$20 / year  
(.com .net .org)

UK domains (.co.uk, .org.uk) \$20  
Australian domains (.com.au) \$110

UK & Australian domain fees cover registration for 2 years

## Business Packages

Company	ilisys	Ozemail	Web Central	Net Registry	Telstra
Hosting package	SoHo	Business Site	Business	The Business	Business
Server space	50MB	70MB	70MB	50MB	75MB
Monthly transfers	1 GB	750 MB	750 MB	1.5 GB	1GB
Domain name .com	FREE	\$66	\$66	\$110	\$330
		for 2 years	for 2 years	for 2 years	(.com.au- for 2 years)
Set up fee	0	\$97	\$97	\$108.90	\$110
Cost of basic package	\$399	\$665	\$665	\$778.80	\$1320
					(\$110/month)
Total including GST.	\$399	\$828	\$828	\$997.70	\$1760

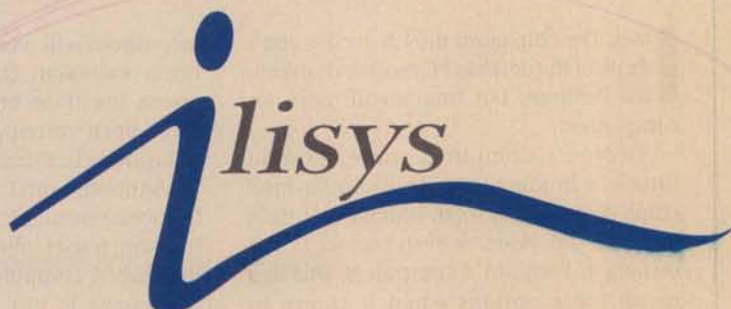
Specifications vary from package to package



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- MYSQL and PHP4 support
- Own CGI-BIN
- Linux or NT server
- FrontPage 98 & 2000 extensions
- Remote control panel via web interface
- Full graphical site statistics
- 1 GB of transfers per month

## Standard \$489/yr. = \$45/month

MORE SPACE!

- 100MB web/ftp hosting space
- 15 POP3 email boxes
- Unlimited email addresses forwarding to multiple destinations
- *imail* (web mail)
- 10 autoresponders
- SSL secure server facilities
- Access and File Maker Pro support
- MYSQL and PHP4 support
- Own CGI-BIN
- Linux or NT server
- FrontPage 98 & 2000 extensions
- Remote control panel via web interface
- Full graphical site statistics
- 2 GB of transfers per month

## Heart

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- Unlimited email addresses forwarding to multiple destinations
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- Unlimited email autoresponders
- Linux or NT server
- FrontPage 98 & 2000 extensions
- Access and File Maker Pro support
- MYSQL and PHP4 support
- Own CGI-BIN
- SSL secure server facilities
- Remote control panel via web interface
- Full graphical site statistics
- 2 GB of transfers per month

\$25 from this package is contributed to charitable causes. Charities include: the Royal Flying Doctors, the Salvation Army and the Royal Life Saving Society Australia.

## Enterprise

MORE SPACE!

- \$799/yr. = \$72/month
- Full Web and email forwarding on a second mirrored domain
- 500MB web/ftp hosting space
- 50 POP3 Email boxes
- Unlimited email addresses forwarding to multiple destinations
- *imail* (web mail)
- Unlimited email autoresponders
- Linux or NT server
- FrontPage 98 & 2000 extensions
- Access and File Maker Pro Support
- MYSQL and PHP4 support
- Own CGI-BIN
- SSL secure server facilities
- Remote control panel via web interface
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# Hot technology storms the PC world

Intel. The chip giant may have the lion's share of the desktop PC market thanks to the Pentium, but there's still room for competition.

Taiwan's Computex trade show in June was buzzing with news of non-Intel chips designed to work alongside Intel's Pentium processor, or even replace it. For owners of Pentium 4 computers, this will mean more options when it comes to memory, chipsets and graphics.

Much of the excitement is about new alternatives to Intel's Pentium 4 chipset — the transistor board that allows the Pentium to communicate with a PC's graphics and memory systems. Up until now, Pentium 4 buyers have had only one choice for their chipset — Intel.

This situation looks likely to change. Intel's rivals argue that they can provide more value for Pentium 4 owners by offering their own chipsets. The premise is that these companies can improve value, not by relying on faster clock speeds, but through other means such as different types of memory and graphics technology.

One key factor here is memory. Pentium 4 computers were originally configured to work only with Rambus memory (RDRAM), not the slower SDRAM used in most PCs. Intel's rivals say that Rambus is too expensive, and there have been ongoing technical arguments about the performance benefits of Rambus.

Now the scenario has changed: a new version of the Pentium 4 currently being

introduced will work with SDRAM and its faster successor, DDR RAM. The change opens the door to Intel's rivals, which have been rallying around DDR as an alternative to Rambus.

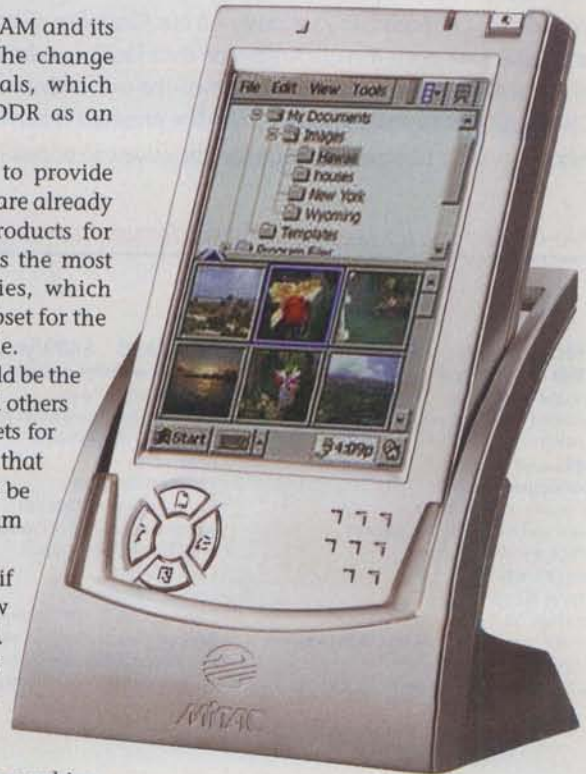
Although Intel may have to provide licences, several of these rivals are already making noises about DDR products for Pentium 4 computers. Perhaps the most aggressive is Via Technologies, which demonstrated a DDR RAM chipset for the Pentium 4 at Computex in June.

Reports indicate that Via could be the tip of the iceberg. Acer Labs and others are already making DDR chipsets for AMD processors. It is understood that these manufacturers would also be ready to offer chipsets for Pentium 4 PCs, if given the chance.

Gamers could also benefit if nVidia manages to offer its new DDR chipset for the Pentium 4. The new nForce chipset includes integrated GeForce graphics technology, which is normally sold to PC owners as a separate add-on card. nVidia claims the combination will mean smoother audio, video and 3D graphics.

At the time of writing, the nForce was available only for PCs with an AMD processor. However, nVidia will undoubtedly be pressured to produce a Pentium version.

While Intel's new 'Brookdale' Pentium 4 chipset will be DDR-compatible by early next year, many people argue



▲ Wireless Bluetooth technology is beginning to appear in devices like this MITAC PDA.

that it will be the introduction of these third-party products that helps kick along Pentium 4 sales in 2002. Initial sales of the P4 were lacklustre; many people opted for the Pentium III, which is still undergoing upgrades.

This is not due to any fault in the design of the Pentium 4. Intel has repeatedly pointed out that the new Pentium 4 design allows for more powerful upgrades in the future, although this has largely gone unheard. A new and improved version, codenamed Northwood, will also be more powerful, with larger caches and transistors shrinking from 0.18 to 0.13 microns. The Pentium 4 will also be the first desktop PC processor to hit 2GHz.

## Notebooks and PDAs

Chip technology is also advancing rapidly in the notebook market. Intel is facing competition from Transmeta, as well as renewed efforts by Via, which has launched a new line of Cyrix processors, and by AMD with Athlon 4.



▲ Via has launched a range of low-power C3 notebook processors.



A range of new technologies are making waves at computer trade shows and conferences around the world. **William Maher** looks at some of the latest developments.

News from Computex is that Transmeta now has a second version of the Crusoe processor — the notebook computer chip that made headlines last year for its low-power, low-heat operation. Reports say that the Crusoe's speed will increase by 50%, while power usage will drop by another 20%. Faster clock speeds could also give the Crusoe a better chance of migrating from tiny notebooks like Sony's Vaio to slightly larger machines.

Via is also using low power operation as a major selling point for its new C3 notebook chip. Unveiled at Computex, the 800MHz mobile C3 runs quietly and without the need for a cooling fan. An 'ultra-low power version' of the chip can operate using less than 1W of power.

Meanwhile, at Intel's International Developer Forum, it was announced that the notebook version of the Pentium III would be revamped. Chips based on the new design will be as fast as 1.13GHz and, like earlier versions, will be capable of slower speeds to save power while the

notebook uses a battery. There is bound to be a great deal of interest in how Via and AMD fare against Intel's new mobile processors.

New options in the handheld PC market are also increasing. These include Linux devices, which are beginning to show up at events like Computex. The battle between Palm and devices which use Microsoft's Pocket PC operating system also continues. Reports now say that Compaq is gaining ground on Palm with its iPaq Pocket PCs.

## Bluetooth and USB 2.0

For handheld PC owners, wireless Bluetooth technology is finally in sight. Bluetooth is the

much-hyped radio frequency technology that allows PCs, notebook computers, PDAs, digital cameras and other devices in the same room to exchange data without cables.

Several Bluetooth-capable handheld PCs were on show at Computex, including the 1ST-PDA from FIC and Mitac's Bluetooth PDA (pictured). The Mitac device uses Microsoft's operating system and there is another version that runs Linux. Mitac products are distributed in Australia, although the company's representative could not say, at the time of writing, whether the Bluetooth PDA would be sold here.

Also on show at Computex were Bluetooth base stations, which provide portable devices with wireless access to the Internet, data servers or other devices. Mitac has a Bluetooth access point, while Ericsson unveiled a similar device at the European electronics expo CeBit earlier in the year.

Bigger players such as Palm are also moving to add Bluetooth to their products. At the Bluetooth Congress in Europe, Palm announced that it is working with

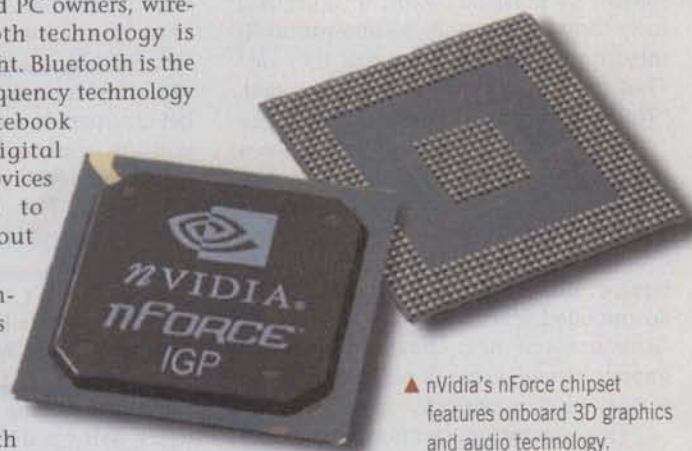
Toshiba on a Palm Bluetooth Card, which should be unveiled late this year. The card fits into the expansion slot in Palm's m500 and m505 devices. Compaq is also working on Bluetooth accessories for its rival PDA, the iPaq.

Bluetooth promises much for handheld PC owners, although the long delay in its arrival has reduced enthusiasm for the technology. For instance, Bluetooth could allow someone to print from a handheld PC to a nearby printer without cables, or connect wirelessly to a nearby Bluetooth base station and surf the Internet.

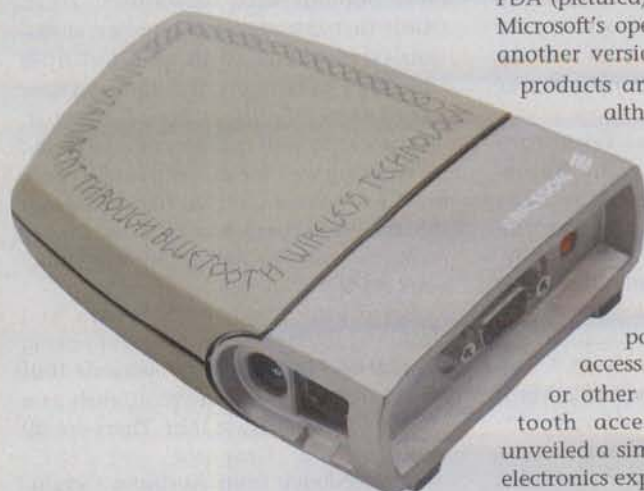
Importantly, Bluetooth support is being added into the new version of the Palm operating system, due for release later in the year. This operating system is used in devices sold by other major hand-



▲ The Palm Bluetooth Card promises wireless communication for Palm users.



▲ nVidia's nForce chipset features onboard 3D graphics and audio technology.



▲ This Ericsson Bluetooth access point provides wireless Internet and data services to mobile phones and PDAs.

held PC vendors, including Handspring, Sony and now Acer.

Another technology that is finally making an appearance is USB 2.0, which allows much faster data transfer than Bluetooth via a special cable. The new version of USB can transfer data up to 40 times as fast as its predecessor, similar to the FireWire technology used in Apple and Sony products. Computex had a variety of USB 2.0 products on show, including add-on cards for desktop PCs and hubs with up to four USB 2.0 ports.

As with Bluetooth, Microsoft has decided that it won't include USB 2.0 drivers with Windows XP (although they can be downloaded separately). Instead, the new version of Windows will support FireWire; time will tell which standard becomes common on desktop PCs.

**William Maher**



What limits are Australians prepared to accept for  
high-speed Internet access?

## The true price of speed

**T**elstra's decision to slap an arbitrary 3G download limit across its cable and ADSL network has left many people wondering whether the rewards of broadband are worth the growing web of restrictions.

Subscribers have been waiting for Telstra to revise its usage policy since October last year, when Optus@Home imposed limits on its supposedly 'unlimited' cable network. Yet many people are shocked that Telstra has capped *all* subscribers, while Optus identifies and disconnects only the heaviest users.

Stuart Gray, corporate affairs manager for Telstra retail, said that Telstra decided against such a system. Under the Telstra policy, no one is kicked off the network, but subscribers must pay extra to download more than the monthly 3G allowance. "If they are kicked off, what can they do? That's a fairly drastic step," Gray said. "This way, they still have access."

Telstra claims that it had to lay down restrictions to curb a handful of heavy users who were degrading the performance of the network. Telstra claims that 5% of subscribers were consuming 35% of bandwidth, while the majority (85%) downloaded less than 3G each month. Gray assured APC that the cap will improve overall network performance, but was unable to quantify the speed increase.

"This was introduced partly to ensure equity of access," he said. "We had a lot of people on a 512/128Kbps connection saying they were sometimes down to what their dial-up service used to be." Telstra contacted the bandwidth hogs, but Gray said they just asked the company to set a limit.

A wave of anger and confusion followed the announcement. APC was flooded with emails from bemused Telstra customers who believed they had signed an 'unlimited' contract. Gray insisted that Telstra had never advertised the service as totally unlimited, but admitted that the use of the word had caused some confusion.

Telstra has removed the controversial word from advertising material, but some existing subscribers feel betrayed. "I signed up after being specifically told by the salesperson that the service was 'virtually unlimited' and 'if you download 500M a day or less you'll be fine'," Telstra

ADSL subscriber Jason Rhodes said. "It is unreasonable to change the terms of the agreement so dramatically. This level of data flow is clearly ludicrous for a 'broadband' service."

After Optus laid down its usage restrictions, the Australian Competition and Consumer Commission (ACCC) banned the company from promoting its service as 'unlimited'. The consumer watchdog has not reprimanded Telstra, although an ACCC spokesperson confirmed it has received "enough complaints to make us concerned". The Telecommunications Industry Ombudsman also gave Telstra the all clear after a short investigation.

Disillusioned subscribers are considering switching providers or returning to dialup Internet services. On top of the extra restrictions, Optus recently raised its monthly fees, destroying the popular view that broadband was only going to get cheaper. According to IDC communications analyst Emilia Wasiak, high-speed Net access *will* grow, in spite of the setbacks. "The 3G limit won't stop growth, but it is nothing favourable," she said.

Australia's broadband market is already a year behind networks in the US and Europe, but Wasiak said that the 3G limit is unlikely to affect or discourage the typical home Internet user. "Power users will be affected, and they may choose to move to Optus, which offers a higher limit," she said. However, she added that the 3G ceiling could hurt the take-up of broadband content like streaming video.

At least some disaffected Telstra customers are opting to pay the higher monthly fee and move to Optus. "The number of subscribers doubled in the weeks following Telstra's bombshell," Optus@Home corporate communications manager Sheila Dhillon said. "A lot of people are asking about our acceptable use policy and what the differences are."

Optus' download limit varies according to the average amount of bandwidth consumed by all subscribers over a rolling 14-day period. Since the rules came into effect, customers have averaged between 55M and 71M per day, so under the 'rolling average' policy, they can safely use 10 times that amount



before breaching the limit. Based on the most recent figures, Optus customers have been allowed 18G per month.

The prospect of six times more bandwidth with Optus could lead to an influx of Telstra's heavy users. Yet Dhillon is not concerned that these bandwidth hogs could drag the rolling average down. "We can't see it changing a great deal," she said. When calculating the figure, Optus excludes the highest and lowest 5% of users.

Time will tell whether Telstra's flat limit or Optus's rolling average policy is more popular with subscribers. When Optus first introduced the policy, it disconnected about 50 people, but after educating subscribers, Dhillon said they have kicked off only a "trivial" number. "It's working well for our customers and it's working well for us," she said. Telstra must wait out the initial backlash from subscribers. "There has been an angry response and we did anticipate that," Gray said.

For the moment, both Telstra and Optus plan to stick to their current pricing structures. "If marketing suggests that there is room for another plan, such as a 5G plan, we will assess that. There are all sorts of options," Gray said.

The feedback from Australia's exclusive broadband community will lay the groundwork for the shape of high-speed Net access in the future.

Fiona Angus



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Microsoft's new Internet browser will go head-to-head with AOL.

# Friendly browsers set to clash

**T**he battle to become the brand of choice for Australian Internet surfers is heating up between Microsoft and AOL. Intended for first-time Web surfers and families, Microsoft's new, free software will compete directly with AOL's browser-and-Internet-access combination, which costs \$24.95 per month.

MSN Explorer differs in key areas from AOL, but the concept is similar. Surfers are directed to the ninemsn home page, and a new toolbar provides direct links to ninemsn sites under headings such as My Shopping and My Weather.

AOL has also upgraded its browser, which is a rebadged version of Microsoft's Internet Explorer. Surfers can access AOL's exclusive Web sites, and surf the Internet.

Despite the similar approaches, the two products tread different paths when it comes to what surfers can see and hear. MSN Explorer has built-in versions of Microsoft Hotmail, MSN Messenger for instant messages, and Windows Media Player for audio and video. AOL 6.0 includes RealPlayer for audio and video and AOL Instant Messenger.

Between them, the browsers present a couple of problems. People using MSN Messenger can't send instant messages to people using AOL Instant Messenger. Similarly, RealPlayer can't be used to watch streaming video configured in the WMA format for Windows Media Player.

For experienced Internet users, these are minor hassles — most people have copies of both RealPlayer and Windows Media Player. However, continuing differences between the two software packages are threatening to push AOL and Microsoft users further apart.

The rift was played out during recent attempts by AOL to have its software bundled with Windows XP. At the time of writing, negotiations had struck trouble; possibly because of the clash between Windows Media Player and RealPlayer.

Even more crucial could be the issue of advertising revenue. With both camps drawing advertising revenue from their sites, pressure is on to steer surfers to them.

MSN Explorer is tailor-made for advertising. Quick links steer surfers to ninemsn sites, and small video advertisements pop up in the corner of the screen (but can be turned off). MSN services such as Hotmail drive traffic to these sites.



▲ MSN Explorer is strong on advertising and ninemsn content.

"More than half of our traffic comes from MSN services, and more than half our revenue from our PBL [Publishing and Broadcasting Limited] properties," ninemsn CEO, Steve Vamos, said. A network of sites from PBL's Channel Nine and Australian Consolidated Press businesses are included in ninemsn.

AOL has begun adding content from new partner Time Warner to help attract people and advertising to its service. The AOL exclusive network hosts content from the Cartoon Network and Who Magazine. "We will be bringing exclusive offers and services to AOL customers over and above what you get on the Internet," AOL's local managing director, Brett Wayne, told APC.

AOL also provides a package including Web browser, email and instant messaging. Wayne and his team at AOL are quick to point out the all-in-one benefits of their software. "This concept of complete integration is nothing new to us, we've been doing it for more than a decade. We have always integrated email, chat, instant messages and message boards," he said.

Control over what surfers see is also a major selling point for AOL. "Once you start unbundling the access service, you aren't able to control the sorts of content available online. It's very important for families," Wayne said.

The two camps view the competition as a race, especially in the US where Microsoft offers a dial-up service similar to AOL's. The winner will be the company with the most people using its software. At the local launch of MSN Explorer, Australian press were told that the gap in the US between people using AOL and Microsoft for instant messaging was less than 1 million.

AOL is far more popular worldwide than MSN Explorer, but this could change. Microsoft is building new instant messaging services into its Windows XP operating system. Once this happens, the incentive to choose Microsoft over AOL will be greater than ever.

Microsoft has taken pains to point out that MSN Explorer is not a replacement for Internet Explorer, which will remain available for those people wanting no-nonsense, unfettered Web access. Version 6 should be released this month and will also be included with Windows XP.

As the owner of Netscape, AOL will compete with Internet Explorer 6 as well. A previous upgrade of Netscape was criticised for having bugs, but a new beta version (Netscape 6.1 beta) is now available. Netscape also offers instant messaging and Web mail.

William Maher

(PBL is the parent company of APC.)





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Will customers trade financial safety  
for convenience?

# Online bankers held to account

**H**alf of all Australian Internet users are now managing their finances online, making banking the success story of the Net. Now Australia's financial watchdog is warning Net bankers that their money could be at risk.

According to the Australian Securities and Investments Commission (ASIC), consumers face a range of dangers when they use 'account aggregation' services. These allow you to view your financial accounts from different institutions together on a single Web page.

To use an aggregation service, you must provide the passwords of all your banking, broking and other accounts. ASIC is concerned that by disclosing your passwords to an aggregator, you also give away your legal protection under the Electronic Financial Transaction (EFT) Code. At present, if something goes wrong, no regulatory framework exists that governs whether you, the bank or the aggregator is liable for any losses.

ASIC's director of consumer protection, Delia Rickard, said that account aggregators need to spell out what consumers could be letting themselves in for. "Providers need to fully disclose how these services work and make sure consumers fully understand the risks," she said. ASIC will meet with financial institutions and aggregators later this month to discuss the regulatory issues surrounding aggregation services. Right now, aggregators have the power to set the rules for their service. "Speaking personally, I would be checking with my bank about what their policy toward password disclosure is," she said.

Until now, Australians have steered clear of account aggregators. Only about 5,000 people have signed up to the handful of local providers brave enough to operate in the uncertain regulatory climate. Macquarie Bank hosts a service using technology from US firm Teknowledge; AMP's service is outsourced to the world's largest aggregator, Yodlee; and local company eWise.com.au hosts a service and licenses its technology to a number of Internet portals.

Macquarie Bank's head of Internet division Rahn Wood admitted that with only 1,000 subscribers, customer growth is

"not overwhelming". The small numbers are surprising considering 2.8 million Australians use Internet banking (according to Market Intelligence Strategy Centre) and 6.5 million adult Australians use the Internet (according to the Australian Bureau of Statistics).

ASIC wants a number of regulatory and consumer issues around the technology resolved before more people start using it. Some major banks are planning to offer aggregation, and ninemsn is about to launch a service using local technology company Parkers Edge.

There are two types of account aggregators in Australia. The 'third-party' model stores all your passwords in a cen-



tral server and retrieves information on request. In the 'user-driven' approach, the aggregator does not have access to your passwords, but encrypts and stores them on your hard drive.

The only user-driven service available in Australia is offered by eWise.com.au. Chief executive officer of eWise Alex Grinberg argues that this model avoids the pitfalls identified by ASIC and complies with the current EFT code. "Our aggregation process operates directly between the consumer and the institution; it doesn't go through us," he said. "We never see passwords, and that is how it should be." Nevertheless, it is unclear to ASIC whether consumers using the eWise service disclose their passwords to a third party. ewise is also not a traditional deposit-taking institution, so its service is not covered by the same strict regulatory framework as banks.

The third-party model is the most widely used around the world. Wood contends that many people prefer to entrust their passwords to an established bank rather than an Internet start-up. "It boils down to what the consumer is comfortable with," he said. "Our concern is that not all consumer PCs have firewalls or are secure, and could be vulnerable to hackers or virus attacks. Many people feel a lot more comfortable with their data behind their bank's firewalls." Macquarie originally outsourced its operation to an overseas provider, but within two months decided to license the technology and run it within its local data centre.

ASIC also raised concerns about the reliability of aggregating technology. Aggregators depend on 'screen scraping', technology which retrieves your password-protected information without the permission (or even knowledge) of your bank. You could end up looking at an incomplete or incorrect balance sheet if your bank suddenly alters its Web site and the aggregator doesn't reconfigure its software.

Macquarie has a 'scrape rate' of over 90%. Grinberg insists it is always clear whether information is incomplete. "We run a great amount of testing and the technology we use works to minimise risk," he said. Some financial institutions have tried to block scraping in the past. "Increasingly, institutions are coming to us and telling us how they would like information presented to customers," he said.

The main barrier to growth has been the reluctance of aggregators to provide consumers with the option to transfer funds between accounts. Rickard suggests that this is partly why ASIC has not had to deal with any disputes. However, this is set to change. "Transactions capabilities are here," Grinberg said. He believes account aggregation is only about 12 months behind Internet banking. According to Wood, Macquarie is prepared to offer transactions even if the reform process drags on. "It is on our agenda," he said.

Rickard believes it is not possible to measure the risk aggregation could pose to consumers. "These issues are better resolved before any dispute arises," she said.

Fiona Angus



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Pressure is mounting for DVD zoning to be scrapped,  
but will Hollywood take notice?

# DVD zoning war heats up

Last Christmas, the Australian Competition and Consumer Commission (ACCC) decided to add to the seasonal enthusiasm for DVDs with an unexpected contribution of its own. On December 21, it announced that it had begun to investigate whether the practice of 'zoning' DVDs is anti-competitive, and whether it forces consumers to pay higher prices for a smaller range of products.

"The ACCC is currently investigating whether Australian consumers are paying higher prices for DVDs because of the ability of copyright owners, such as film companies, to prevent competition by restricting imports from countries where the same (authorised) video titles are sold more cheaply," chairperson Allan Fels said. He pointed out that although it is legitimate for companies to restrict mass imports by distributors, the same does not apply to individual purchases from around the world. "There will likely be a large number of disappointed consumers who... cannot make use of their overseas purchases," he predicted.

Under the zoning scheme, the world is divided into six commercial regions. DVDs designed for sale in one region don't work on players sold in another region. Australia is in zone 4, along with New Zealand and South America, so DVDs ordered from sites in other parts of the world don't work on standard local players. Multizone DVD players do exist, and players designed for one region can be modified to play discs from other regions, but doing so usually invalidates the warranty.

Fels' attack was welcomed by movie-hungry DVD fans, but on its own, Australia was unlikely to force any large-scale changes to DVD zoning. However, the European Union (in zone 2) has now weighed into the DVD debate. It agrees that the zoning model is anti-competitive and could result in higher prices, and has launched

an ongoing investigation into the problem. The EU has shown itself increasingly willing to enter into arguments concerning competition policy with the US, and its political clout means that any action it takes against DVDs will be taken seriously.

The European market is particularly concerned that DVDs are over-priced because of zoning. This is sometimes the case, but the argument does not always hold true. Exchange rates play a large part in pricing differences. For example, the weak Australian dollar has meant the price difference between overseas and import copies has eroded. APC's brief survey of international prices (see below) showed that only Singapore offers cheaper DVDs when exchange rates are taken into account. This issue is less relevant in Europe, where US titles are considerably cheaper even after exchange rates are taken into consideration.

## Beyond price

DVD pricing is important, but it's not the only reason DVD viewers are up in arms over the region coding system. The ACCC has ranked the wider range of movies available in zone 1 (the US) as an equally important issue. "Private importation of DVDs, either via the Internet or from purchases acquired during international travel, has been an attractive option for Australian consumers, as it is widely accepted that discs produced overseas, particularly in the US, provide significantly greater consumer choice in terms of the range of movie titles available on DVD and the additional features displayed by those titles," Fels said.

The movie studios pushed for DVD zoning in large part because it would allow

movies to be released cinematically and on DVD at different times around the world. For instance, children's films that receive a summer (mid-year) release in the US sometimes appear in Australia in September or December to tie in with school holidays. By the time this happens, the zone 1 DVD version is likely to be on sale. (The same principle also applies in reverse; the hit Australian movie *The Dish* was released in US cinemas at the same time that the DVD version became available in Australian shops.)

In a bid to avoid criticism and minimise piracy, movie studios are making a greater effort with major films to organise simultaneous worldwide releases. For instance, the long-awaited DVD version of *Star Wars Episode I: The Phantom Menace* is being released around the world on October 16. This approach is currently the exception rather than the rule, but the ongoing EU investigation may prompt a change in the politics of DVD that sees global releases become more common.

However, the releases will still feature region coding, so merely switching to simultaneous release won't eliminate the competition problem or lower prices. It's unlikely that Hollywood studios will change coding practices without a fight. The Motion Picture Association of America (which counts major studios such as Disney, MGM, Paramount, Twentieth Century Fox, Sony and Warner among its members) has fought a long and costly battle to block the distribution of DeCSS, a tool for decrypting DVDs. The widespread availability of region-free DVDs could lead to increased piracy, so the MPAA is unlikely to accept the EU's decision unquestioningly.

Angus Kidman



## The Geography of DVD

*The Matrix* is the best-selling DVD title in Australia. How much does it cost in different world regions?

Zone 1 (includes US)	\$US24.90 (approximately \$49)
Zone 2 (includes Japan, Europe)	GBP19.99 (approximately \$55)
Zone 3 (includes South-East Asia)	\$SG24.90 (approximately \$27)
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Prices are list as sourced from Net retailers and do not include shipping charges. Conversions are approximate as of July 2001.



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# AMD's technical knockout

APC has reported on the Pentium 4 several times since its release in November 2000. Some reports were favourable, others were critical. The last (APC June, page 38) was mixed: the performance of the 1.7GHz Pentium 4 tested was not stunning, but price cuts were on the way that would make the processor more appealing.

Those price cuts proved to be dramatic. It is now not unusual to see Pentium 4 systems advertised for under \$2,000, which makes for an interesting dilemma: do you buy the system with an underperforming processor or wait for something better? At the time of the last review, AMD hadn't released any new processors for a while, but now it has — a 1.4GHz version of its Athlon chip.

Intel's Pentium 4 diverged from previous chip designs, but AMD has stuck to its old designs and has continued to release faster processors, albeit less frequently than Intel. The Athlon chip still needs an overhaul, just as the Pentium III did, but there's a lot of life yet in the current design; just how much remains to be seen. AMD aims to avoid the costly mistakes Intel made with the Pentium 4, but in doing so, its processors are falling behind Intel's in speed.

## Head to head

The Pentium 4 is a good processor, but it wasn't worth the price originally charged for it. Neither is it an all-purpose chip. The design limits its use in business applications, but it excels at tasks such as video compression and gaming. The AMD Athlon is a jack-of-all-trades processor, much like the Pentium III.

APC Labs put the AMD 1.4GHz machine and the Gateway Performance 1700 through the usual battery of tests, and the results were very interesting. The 1.4GHz AMD Athlon is so new that, at the time of writing, no units were available to the public.

The machine AMD sent to us for review was a reference system that is unavailable to the public, but it gave a good indication of what a 1.4GHz Athlon chip is capable of. To broaden the scope of this comparison, APC also tested a Select 1300 system from Gateway which used a 1.3GHz AMD Athlon processor.

All three systems came with nVidia GeForce2 graphics cards, 20G hard drives and 256M of RAM. The AMD machines

had DDR SDRAM and the Pentium 4 machine had RDRAM. Later this year, the release of the new Pentium 4 and Intel's Brookdale chipset will allow for DDR SDRAM Pentium 4 machines. All systems ran Windows Me and were configured for testing prior to benchmarking.

As the table (right) shows, the systems scored in the same order in most tests. The 1.4GHz Athlon reference machine led by a fair margin, the Gateway 1.3GHz Athlon Select 1300 followed, and the Gateway Performance 1700 1.7GHz Pentium 4 brought up the rear.

This supports APC's view that the Pentium 4 will always be outperformed by Athlon processors running at lower clock speeds. The two benchmarks that display the processing power of the chips when handling business applications (the Ziff-Davis Business Winstone 2001 and MadOnion SYSmark2001 benchmarks) established the 1.4GHz Athlon as the outstanding leader. A lead of six-and-a-half points in Business Winstone 2001 is exceptional, especially for a processor running at 300MHz less than the Pentium 4.

The Athlon also had a noticeable lead in the rest of the benchmarks. It's worth remembering that although some scores were close, clock speed varied greatly between machines. After all, if a 1.4GHz Athlon can outrun a 1.7GHz Pentium 4, imagine what a 1.7GHz Athlon would be capable of.

The Pentium 4's strengths were revealed in the gaming tests. The Performance 1700 scored an amazingly high frame rate for Quake III Arena (171fps), which the Athlon machine, even at 162 fps, could not match.

The bottom line is that the Athlon is far superior to

### Benchmark results

#### Business Winstone 2001

Gateway Performance 1700 1.7GHz (P4)	42.4
AMD reference PC 1.4GHz (Athlon)	49
Gateway Select 1300 1.3GHz (Athlon)	45

#### SYSmark2001

Gateway Performance 1700 1.7GHz (P4)	146
AMD reference PC 1.4GHz (Athlon)	152
Gateway Select 1300 1.3GHz (Athlon)	148

#### Business Graphics WinMark 99

Gateway Performance 1700 1.7GHz (P4)	378
AMD reference PC 1.4GHz (Athlon)	464
Gateway Select 1300 1.3GHz (Athlon)	412

#### High-end Graphics WinMark 99

Gateway Performance 1700 1.7GHz (P4)	1,110
AMD reference PC 1.4GHz (Athlon)	1,800
Gateway Select 1300 1.3GHz (Athlon)	1,460

#### 3D Winbench 2000

Gateway Performance 1700 1.7GHz (P4)	160
AMD reference PC 1.4GHz (Athlon)	159
Gateway Select 1300 1.3GHz (Athlon)	156

#### 3Dmark2001

Gateway Performance 1700 1.7GHz (P4)	3,571
AMD reference PC 1.4GHz (Athlon)	3,943
Gateway Select 1300 1.3GHz (Athlon)	3,759

#### Quake III Arena timedemo (1,024 by 768)

Gateway Performance 1700 1.7GHz (P4)	171
AMD reference PC 1.4GHz (Athlon)	162
Gateway Select 1300 1.3GHz (Athlon)	119

#### Business Disk WinMark 99

Gateway Performance 1700 1.7GHz (P4)	6,893
AMD reference PC 1.4GHz (Athlon)	6,560
Gateway Select 1300 1.3GHz (Athlon)	6,720

#### High-end Disk WinMark 99

Gateway Performance 1700 1.7GHz (P4)	21,567
AMD reference PC 1.4GHz (Athlon)	22,800
Gateway Select 1300 1.3GHz (Athlon)	22,154

The products used in these tests are shipping versions available to the public at the time of publication unless otherwise stated. All specifications details are submitted by the vendor and APC accepts no responsibility for any errors within. Winstone, WinBench and associated products are registered trademarks of the Ziff-Davis Publishing Company. These tests were performed without independent verification by Ziff-Davis and Ziff-Davis makes no representations as to the results.



APC Labs compares two new processors: the 1.4GHz AMD Athlon, and the first commercial 1.7GHz Pentium 4.



the Pentium 4 *at the moment*. The Pentium 4 is currently nowhere near its maximum clock speed, and will be manufactured at 2GHz and beyond. The Athlon needs some tweaking, because the current design cannot be pushed much further. In the meantime, the Pentium 4 is gradually pulling away.

## The system

Gateway's Performance 1700 is the first commercially available 1.7GHz Intel Pentium 4 system APC Labs has seen. It is an excellent system: it's fast, has lots of storage and plenty of goodies inside, but it doesn't compare favourably to the 1.4GHz AMD reference system, despite having an almost identical configuration.

As there were no 1.4GHz AMD Athlon machines for sale at the time of writing, it was hard to make comparisons on a bang-for-buck basis. Gateway sells a 1.3GHz version, but as APC went to press, the company hadn't decided whether a 1.4GHz Athlon machine would be made

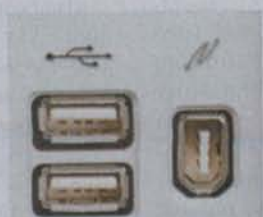
available. The 1.3GHz Select 1300 with basic configuration retails for \$3,199. Assuming that a 1.4GHz machine would cost a little more, it would probably sell for roughly the same price as the 1.7GHz Intel machine.

Intel's price cuts have helped sell more Pentium 4 machines than at first looked likely. Sales will also increase with the upcoming release of the new version of the Pentium 4 and the planned DDR-capable Pentium 4 motherboard.

Although APC's tests consistently ranked one processor below the others, and found that speeds weren't as fast as they could be, it's worth remembering that these are the very latest and fastest processors on the market. Is the Gateway Performance 1700 as good as the AMD reference machine? No. Is it

an excellent system? Yes.

On its own merits, the Performance 1700 is a beauty. Sure, the processor can't compete with the latest Athlon, but it's more than ample for home, gaming or business use. If you plan to make movies



A FireWire and two USB ports located on the front of the box make life easy.

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or edit DV on the system, you could do a lot worse. The unit is great for playing games or watching DVDs. The monitor style is sleek, and it has jog dial for accessing the onscreen display that has been praised in past APC monitor reviews. The audio is also superb. Gateway has been bundling Boston Acoustics speakers with machines for years, and APC has always found the audio quality to be excellent.

The general design of the system is very good. The case has screwless entry, and similar latches hold the internal drives in the bays. This is great for tinkerers, and should save many scraped knuckles. However, the most impressive aspect of the system is the presence of two USB ports and a FireWire port on the front of the case. Hopefully, more manufacturers will emulate this feature.

At \$3,399, this is a high-end machine at a very reasonable price.

Darren Ellis



# Sony VAIO PCG-R505CT

Sony's latest notebook has been lumbered with an awkward model number, but it's an impressive product all the same. The slim design and sleek magnesium alloy casing make it the most elegant member of a range already considered leaders in style.

The R505CT has two parts. The notebook is a 1.7kg wedge that measures barely 1cm at the front and 2.5cm at the rear. The increase in thickness is mainly due to the battery pack, which Sony rates at up to four hours' life. There's no floppy or CD drive, but connectivity is still good: the notebook features two USB ports, one PC Card slot, a 4-pin i.LINK (IEEE 1394) port, internal 56K modem and 10/100 Fast Ethernet. There's also an output to drive an external monitor port.

A slot for Sony's proprietary Memory Stick card is included. As it's compatible with the Magic Gate format used on other Sony multimedia devices, moving files between those devices and the R505CT is easy. All of the ports and slots are logically placed on each side of the box.

The notebook also comes with a docking station, which adds a combined DVD/CD-RW drive (rated at 8x DVD read and 8x4x24 CD write/rewrite/read) and a 3.5in floppy drive.

The notebook ports are replicated at the rear of the docking station, along with a serial and parallel port. The only thing missing from this configuration is a PS/2 adaptor for adding an external keyboard and mouse. However, USB is now the preferred method for these devices.

The base station has been replicated with portability in mind. The station's two drives are powered by the main system's battery supply, and the total package weighs no more than 2.8kg — no burden when you're travelling.

Even dispensing with the dock leaves you with a no-compromise notebook. Indeed, the R505CT still delivers

enough oomph to attract serious notebook enthusiasts.

Sony aims to make the R505CT a robust mobile PC with the capacity to handle intense gaming, digital video editing and DVD movies as competently as any current desktop box. The system includes a suite of basic home DV editing software, so the R505CT can be considered both a home/office notebook PC and a competitor to Apple's DV-friendly notebooks.

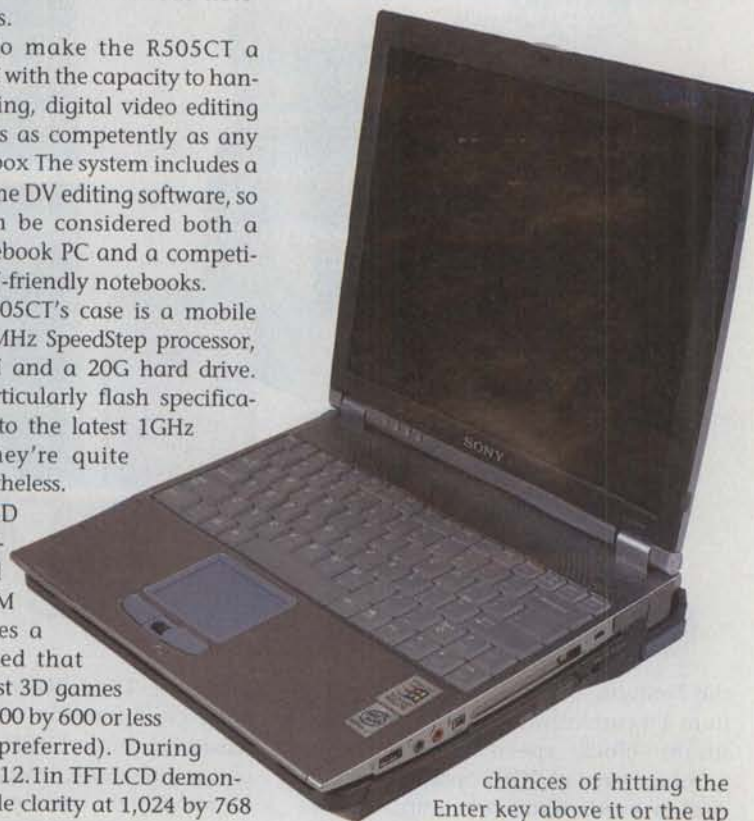
Inside the R505CT's case is a mobile Pentium III 850MHz SpeedStep processor, 128M of SDRAM and a 20G hard drive. These aren't particularly flash specifications compared to the latest 1GHz systems, but they're quite respectable nonetheless.

The system's 3D graphics capabilities are provided by Intel's 815 EM chipset. This does a fine job, provided that you play the latest 3D games in resolutions of 800 by 600 or less (640 by 480 is preferred). During APC's testing, the 12.1in TFT LCD demonstrated remarkable clarity at 1,024 by 768 screen resolution.

In past reviews of Sony VAIO notebooks (see APC May, page 64), APC Labs had problems installing and running some of the benchmarks. The Sony R505CT was no exception, and refused to run the Ziff-Davis Winstone 99, WinBench 99 or MadOnion SYSmark2001 benchmarks. These benchmarks provide a practical indication of processor and RAM speeds, and without them, direct comparisons with other notebooks are impossible.

Two small built-in speakers complement the capable SoundMAX digital audio sound chip, but provide tinny and easily distorted sound amplification. APC strongly recommends that you use the headphone jack on the right side of the system.

Despite Sony's close attention to the design of the R505CT, the layout of the keyboard is less than ideal. The size of the right Shift key has been reduced to that of a standard key (approximately 18mm). This increases the



chances of hitting the Enter key above it or the up arrow key below it. The Insert key is also positioned directly above the Backspace key. Using a word processor with this keyboard could be frustrating. On the plus side, the keyboard is very light and responsive to touch.

The PCG-R505CT is a slick notebook that packs in just about everything the discerning mobile PC enthusiast could want — processing power, plenty of storage space and a wide range of interface ports. On nearly all fronts it is aesthetically pleasing and user-friendly. However, although it has what it takes to perform basic DV tasks with ease, it should not be mistaken for a similarly priced high-end multimedia production box.

*March Stepnik*



- Pros** Attractive and capable  
Good features
- Cons** Cramped keyboard layout

**Contact** Sony Australia  
**Phone** 1800 226 429  
**Online** [www.sony.com.au](http://www.sony.com.au)  
**Price** \$5,899



# Iomega Peerless

Storage — you can never have too much of it. If you were one of the first to embrace the 100M Zip disk, and bought one of the first CD burners, you're probably finding even 650M is not enough. If so, Iomega's 10G and 20G Peerless drives are bound to attract your attention.

The marketing campaign for the Peerless concentrates on three tantalising features: size, speed, and portability (it's no coincidence that this formula also established the Zip disk as the de facto super-floppy). If you're using USB, Peerless only provides two of those three advantages.

Peerless takes mass-produced compact hard disk drives for notebooks to the next level. Iomega settled on IBM's highly regarded Travelstar 2.5in drive, and encased the disk and read/write heads in a fully sealed cartridge, barely larger than a Palm handheld, with a single interface at one end.

Available in capacious 10G and 20G versions, the disks can back up anything from a desktop or notebook hard drive to a modest network storage server. They can also hold your entire collection of video clips, home movies and MP3s ripped at a CD-quality 160Kbps.

The cartridges slide into a 'base station' (more accurately described as a disk caddy) which houses the disk controller and other electronics. This, in turn, docks into a desktop interface module which provides connection to a Windows PC or Mac, and to the power supply, using a compact 240V adaptor rather than the cumbersome power brick favoured by many 'portable' devices.

The interface modules are available for USB or FireWire, and SCSI and USB 2.0 variants are expected later this year.

Once you have got your head around the initially confusing 'Russian doll' approach to the cartridges, bases and

modules, you can appreciate the flexibility of Peerless as a portable data system.

The basic building block of the system is a package that contains a disk, base station and desktop interface module (your choice of USB or FireWire), priced at \$995 for 10G or \$1,095 for 20G. Extra disks sell for \$449 for 10G, and \$549 for 20G. Iomega also plans to offer base stations and modules in combination or on their own, so you can set up several locations and transport the Peerless cartridge (or the cart and caddy) between them.

Local pricing for these standalone items had not been announced at the time of writing, but US prices indicate that you'll pay about \$550 for the base station with the module pair, and about \$200 for the USB or FireWire interface modules. Full marks to Peerless for giving us 20G to go.

However, the speed at which you can access that data is likely to disappoint. Iomega boasts that Peerless is even faster than a CD drive, and has transfer rates of "up to 15M/second". This is technically accurate, but only the FireWire model can reach those dizzying speeds. USB, which is far more commonplace, has a maximum transfer rate of 1.5M per second.

In APC testing, it took 3 minutes and 53 seconds to copy a 200M file from a 20G USB Peerless system to a desktop machine. This was a negligible 12 seconds faster than on a USB Zip 250 drive, and underscores the fact that USB is the speed limiter. Partnering Peerless with today's USB 1.1 spec is like hitching a Ferrari to an eight-berth caravan. However, you can expect a quicker pace from USB 2.0 when it is released.

Replacing the USB interface module with a FireWire module allowed the same

file to hotfoot it over in 16 seconds — a full two seconds faster than the test machine's internal Ultra ATA hard drive. On a 48x CD drive, it took a more leisurely 52 seconds.

Even under USB 1.1, Peerless is a superb multimedia playback or demonstration device. APC used the drive for storing and show-



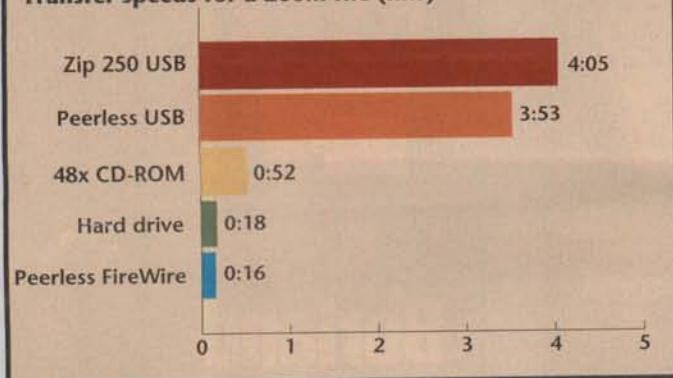
ing BMW's series of Web movies entitled 'The Driver'. The throughput was consistently high, just shy of USB's upper limit — and there were no instances of frame-jumping or out-of-sync audio.

It's also possible to back up your entire hard disk drive, provided you're patient — it takes over six hours if you opt for the USB interface.

The chic-looking Peerless exhibits the same design influences as its siblings. Organic curves and a silvered fascia are offset by scalloped ash-black fairings. The designers couldn't resist some rather overly cute touches, such as the large Iomega button which throbs blue with disk access, and the small LCD that indicates the transfer speed. The former has some merits, but the 'speedometer' has little real value. It's impossible to read unless you stoop down to near desk level.

David Flynn

Transfer speeds for a 200M file (m:s)



- Pros** High capacity  
Portable mix-and-match design  
Choice of FireWire and USB
- Cons** Performance under USB is abysmal

**Contact** Iomega

**Phone** 1800 466 342

**Online** [www.iomega.com/anz](http://www.iomega.com/anz)

**Price** 10G bundle: \$995,  
20G bundle: \$1,095,  
10G disks: \$449,  
20G disks: \$549



# Canon IXUS V digital camera

Inspired by the success of its chic and ultra-simple IXUS digital camera, Canon has boosted the popular digital snapper by giving it the ability to record video clips as well as audio. It's just a shame that the new IXUS V is also seriously more complicated and more expensive.

The only indication that the V is different from its predecessor is a tiny gold microphone on the front panel. The size of the whole thing means it's too easy to hit the power button accidentally and switch off the camera. The other controls, such as menu, program settings, macro (which isn't anywhere near as 'macro' as some other cameras), zoom and playback options are all quite obvious and accessible.

The camera comes with a double CD set which contains ArcSoft's Photo and Video Impression software, as well as a disc that holds USB, serial and TWAIN drivers, Photo-Stitch and slide show utilities. The kit includes the same ultra-compact charger as the IXUS 300, a USB cable and a TV-out cable. Surprisingly, the camera comes with a meagre 8M CompactFlash card, which, given its movie capability, seems a bit

stingy. The sensor is a 2.1-megapixel unit, backed up with Canon's excellent 1.5in, super-bright LCD screen, as well as a viewfinder. Once shooting, all the usual auto-flash, auto-focus and auto-exposure capabilities are available, with little in the way of manual interference allowed.

Only exposure bracketing or monochrome options are available. Power-up and shooting lags are both good, at about 3 seconds and 1.5 seconds respectively. The two times zoom action from the 35-70mm equivalent lens was smooth and progressive, the only annoyance being the focus-aid light, which insists on lighting up at every opportunity, making discreet, flash-less snaps impossible.

The image quality is great. Very neutral and natural colours are complemented by excellent resolution, even at higher compression levels (choose from superfine, fine or normal), maximum resolution being at 1,600 by 1,200 — enough quality for A4 blow-ups in good conditions.

AVI files can only run for 30 seconds maximum at the lowest resolution (160 by 120), which could be good or bad, depend-



ing on how much you like grainy movies. The battery lasts about an hour, and the whole thing costs just under \$1,200. This, given its size, newly extended capability and quality, is still excellent value — just as long as they don't complicate it any further.

Jeremy Torr

- Pros** Quality lens  
Excellent image rendition  
Tiny charger
- Cons** Small 8M memory card  
Size and location of power button

**Contact** Canon Australia  
**Phone** 1800 816 001  
**Online** [www.canon.com.au](http://www.canon.com.au)  
**Price** \$1,199

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# Netscape 6.1 public preview

It's better, but is it the best? That's the question everyone's asking about the 'public preview' edition of Netscape 6.1.

The first release of Netscape 6 contained plenty of surprises: a revamped interface, a completely rewritten rendering engine, and a great many bugs. So many, in fact, that a lot of people downgraded back to the relatively stable Netscape 4.7.

Judging by what's on show in this beta release of 6.1, Netscape is a lot closer to realising the goals it set for 6.0. And not before time. The problems were inexcusable for a browser that had been in the works for almost two years. Even at this early stage, Netscape 6.1 is faster, more stable and even a little better looking than its predecessor.

## Internet Explorer 6.0 refresh

Microsoft hasn't exactly been sitting on its hands of late. A new 'refresh' build of the Internet Explorer 6.0 public preview has been posted online, which refines the feature set already unveiled in betas of Internet Explorer 6 and Windows XP.

Some elements that appeared in previous betas have been culled. For example, the integration of the MSN Messenger list with Internet Explorer's sidebar, also known as the Contacts panel, didn't go down very well with beta testers. A revised version of the sidebar — the Personal Bar — which was cluttered with all sorts of tools for media playback and other tasks, has also been yanked.

The most widely touted addition to 6.0 is support for Platform for Privacy Preferences (P3P), a standard for controlling how your personal information is used by Web sites you visit. Sites without a privacy policy are flagged with an icon, but let's face it, by the time you go to the site, it may already be too late to protect your information.

Another big change is in the handling of images. If you pause the mouse over an image, a set of tools for saving or printing images comes up. Images that are too big for the browser window can be automatically resized to fit. As with any good program, you can turn all of these features off if you wish.

You have two choices when installing Netscape 6.1: you can grab everything at once, or you can download a smart installer that only fetches what you need. APC chose this route and was happy to discover that if the installer locks up midway (as ours did), you can abort it and resume where you left off.

Optional extras include AOL Instant Messenger, RealPlayer Basic, WinAmp, and a slew of other bits and pieces. APC decided to go for the whole shebang, and found that if you already have 4.7 running, 6.1 co-exists with it quite gracefully, and does a neat job of migrating your settings.

The interface has been cleaned up; for example, the two bars at the bottom have been consolidated into one, but My Sidebar (a love-or-hate feature) remains. Pages are rendered much more reliably than in 6.0, and even an Internet Explorer-specific site such as the MSNBC home page shows up correctly. Flash 5.0 is also included, so Flash-heavy pages work correctly the first time without requiring a download.

There are plenty of minor improvements that really add up. In earlier versions of Netscape, you could press Tab to leap from element to element in a form. In 6.0, this worked until you hit a freeform text box, after which the Tab key inserted the Tab character.

Netscape 6.1 allows you to tab through all manner of form objects. Timeout problems with very long-loading pages have also been remedied. Netscape boasts that 34 of the most common fatal bugs in 6.0 have been repaired.

Some features have also been improved. For instance, if you start typing a formerly-visited URL in the address window, 6.1 not only suggests the closest matches based on previous visits, but also appends the name of the visited page to each URL to further jog your memory.

Bugs are still to be found in this preview beta. When APC tested it, copying and pasting text from a Web page sometimes resulted in chunks of previously invisible HTML code turning up in the copied text. Occasionally, pages stalled part-way through loading, but a refresh fixed that. Some pages with tables didn't render correctly at all, even though they didn't rely on exotic code and looked fine in Internet Explorer.

The nicest thing about the Search feature is that it's extensible: you can add



plug-ins to the browser to return results from more search engines if you don't like the existing choices. This compares favourably with Internet Explorer, which only allows you to choose search engines from a preconfigured list.

The major drawback to this agglomeration of features is clutter. Wading through Netscape's collection of sidebars, bottom bars, drop-down lists and menu choices can be perplexing, even if you're already accustomed to Netscape. One thing that hasn't changed too much is the arrangement of the Preferences dialog — many of the same headers (such as Appearance, Navigator, Mail and Newsgroups) appear as they did in Netscape 4.7.

Finally, as you'd expect from a preview release, this is still crash-prone. The first time it bombed, it hadn't even finished loading completely. A number of controls are clearly marked 'beta'. Despite this, the public preview of 6.1 is rather more promising than the half-finished product that surfaced before 6.0 was formally released.

Netscape is too big to be counted out of any PC wars; perhaps the release of 6.1 will help bring some of its lost audience back to the fold.

Serdar Yegulalp

- Pros** More stable than 6.0  
Smoother rendering of pages
- Cons** It's still a beta, so don't expect perfection

**Contact** Netscape  
**Online** [www.netscape.com](http://www.netscape.com)  
**Price** Free



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# MSN Explorer

As Microsoft and Netscape duke it out with their sixth generation browsers (okay, Navigator skipped 5.0, but let's not be picky), Microsoft has also been grooming a new contestant for the ring. MSN Explorer is a revamped edition of Internet Explorer, built for a broader family audience. Closer to the AOL client than to Internet Explorer, this browser has big bright buttons, built-in email, instant messaging, streaming audio and channel-based content. It's certain to start popping up on PCs where ease of use is valued well above control and sophistication.

What makes this browser of more than passing interest is that it represents Microsoft's .NET vision at large. The program signs you into Passport, ties together MSN-branded services such as email, instant messaging and online file storage, and even downloads and installs its own updates.

Despite being dressed up with oversized, almost cartoonish icons, MSN Explorer has been locked down so that almost every one of those icons is hardwired to an MSN service — or for the Australian release, to ninemsn, which is a joint venture between Microsoft and Publishing and Broadcasting Limited (the parent company of this magazine). For example, the buttons for People and Chat, Finance, Shopping and Music, all take you to ninemsn hubs. Of course, the home page is [www.ninemsn.com](http://www.ninemsn.com) (and no, it can't be changed).

The local effort lacks the rich layout and strong content customisation options that characterise the US parent site ([www.msn.com](http://www.msn.com)), but it's a snug, if cloying, experience nevertheless.

The appeal of MSN Explorer is based on that same snug fit. Everything takes place in a single window. Web browsing, email (through Hotmail), instant messaging (through MSN Messenger), Net radio and even the screen for changing settings and preferences all appear as HTML pages inside the main MSN Explorer frame. There's no need to dive into secondary menus and windows.

A vertical icon bar that's almost too-cute-ly tagged My Stuff runs down the left side of the screen. At the foot of the bar is a built-in media player based on the Windows Media Player. It's all highly reminiscent of the Personal Bar, which has since been dropped from the Internet Explorer 6.0 beta.

At the top of this sidebar is a link to a pop-out weather report and three-day fore-

cast for your nearest capital city, along with a handful of news headlines. Click More Weather for a full-screen meteorological map, other Australian and international forecasts, satellite images and maritime reports and tidal times.

The rest of the buttons direct MSN Explorer to other ninemsn sites, which is where some confusing duplication

sets in. My Calendar points you to your personal online MSN Calendar; My Web Sites directs you to a subset of ninemsn 'community sites' (sure to prompt head-scratching when users ponder the difference between My Web Sites and their Favourites list); My Photos whisks you to an online photo album; and My Radio points to Microsoft-approved streams listed on the Windows-Media site. So far, so good.

However, the Shopping button (on the main toolbar) and My Shopping both port to the ninemsn online shopping mall. Finance goes to ninemsn finance, but My Stocks goes to ninemsn investor, which can't be customised to display only the stocks in your portfolio. Because there's no dedicated movie sub-section, My Movies is no more than the central page for the ninemsn entertainment portal. What *should* have been Microsoft's most enticing tool for novice Net users has been approached with little more than an add-on mentality.

Of course, you can ignore most of the buttons and bows and stick to the primary functions of MSN Explorer. This is where it shows some surprising strengths that even Internet Explorer can't match. When you first load the browser, you're asked to enter your existing Hotmail or MSN account, and given the opportunity to create a new account based on the @msn.com address. There's no way to run MSN Explorer without a logon to one of these services.

The login screen (which bears a close resemblance to that of Windows XP) supports up to nine users and a guest. Each sees their own list of favourite sites, email and IM buddies. This makes MSN Explorer the ideal browser for sharing PCs at home or in school.



Because all personalised browser settings, including bookmarks, are stored online, you can log onto MSN Explorer from any PC and use the same familiar interface. However, the constant trips back to the server can be a drag for those with dial-up connections, and overall it's slower than Internet Explorer.

MSN Explorer automatically logs you into Passport and the associated Hotmail and Messenger services. If you run Office XP, the file-save and file-open dialog boxes of Word, Excel and other packages also include your online MSN 'file cabinet'.

The integrated Hotmail-based email client has a cleaner look than Hotmail, thanks to large well-labelled tabs and the iconic toolbars for formatting messages as rich HTML text. Some facets of the full Web service, such as the ability to poll an ISP's POP3 mail server, aren't available.

MSN Explorer is comfortable sharing a hard drive with Internet Explorer, but APC found that attempting to run them at the same time often resulted in a system hang. Having both options allows you to run Internet Explorer for the grown-ups and MSN Explorer for the kids.

David Flynn

- |             |  |
|-------------|--|
| <b>Pros</b> | Ideal interface for first-time surfers<br>Integrated email, messaging and file storage |
| <b>Cons</b> | Lacks IE's power and customisation<br>Too closely tied to ninemsn                      |

**Contact** ninemsn  
**Phone** (02) 9383 6000  
**Online** [explorer.ninemsn.com.au](http://explorer.ninemsn.com.au)  
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# DVD Studio Pro and Final Cut Pro 2.0

DVD is the fastest growing consumer electronics category worldwide. There are over 13 million DVD players in the US, and Columbia Tristar estimates that there are more than 800,000 consumer players and 400,000 DVD-ROM drives in Australia.

According to Apple, DVD authoring will be the next killer application. Once the technology matures and becomes more affordable, editing video and recording to interactive DVDs capable of playing in home DVD players will take off. Apple believes that the scale of this shift will exceed even the desktop publishing revolution of the 1980s, which was extremely profitable for the company.

However, as video professionals know, authoring DVDs can be a very painful and expensive process.

Video material must first be encoded into MPEG-2, a process that can be very time-consuming if you want high quality results. Good software encoding can take as long as 25 times real time. This means that a single hour's presentation can take a full 25 hours to encode.

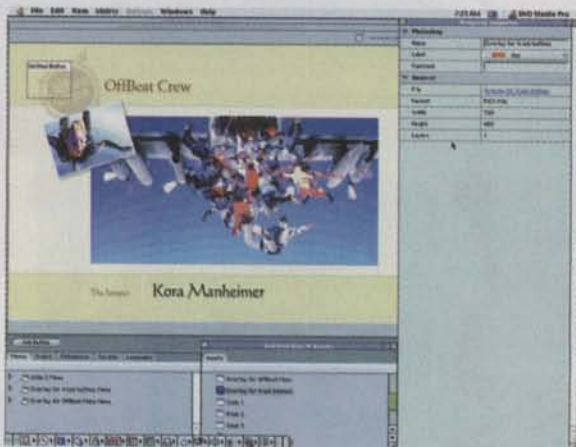
Then there's the authoring process. Creating graphics and organising the menus and the overall structure of the presentation is no easy task with most tools. Good authoring software is also quite expensive. Next comes the burning: DVD writers that are compatible with regular DVD players cost around \$7,000.

Apple's effort to kick-start the DVD revolution is being led by the new 733MHz G4 Macs. These come with the breakthrough SuperDrive (Pioneer's DVD burner), which not only plays DVDs and CD-ROMs, but can record onto CD-RW and DVD-R.

Apple's DVD authoring suite is made up of three components: DVD Studio Pro; the new SuperDrive-equipped G4 machines; and version 2 of Final Cut Pro digital video editing software, which is for capturing and editing raw video footage.

Final Cut Pro offers a refined and responsive user interface, and version 2 adds to the already extensive editing, compositing, filters and effects in version 1 with improvements in performance, media management, title creation and documentation (it includes a 1,400 page manual).

As with DVD Studio Pro, Apple has finetuned *Final Cut Pro 2* to take advantage of the G4 processor's Velocity Engine



circuitry, as well as the allure of multi-processor Macs. Time-consuming tasks, such as rendering transitions and crunching through complex motion-graphics sequences, are now dramatically faster.

Final Cut Pro 2 also works with third-party hardware to render commonly used effects and motion-graphics features in real time. For example, Matrox's \$2,499 RTMac PCI video card is a perfect companion to Final Cut Pro 2. RTMac provides real-time effects, has a connector for a second monitor and includes a breakout box for connecting analog video gear.

The combination of Final Cut Pro and DVD Studio Pro will represent a massive learning curve for new users. As with any software, to use it properly you need to spend some time becoming confident with the program's tools and workflow logic.

Both programs offer extremely powerful authoring options, but they are also complex and intricate pieces of software to master. However, anyone familiar with the principles of video editing and multimedia production will not find adapting to the program's features and functions too hard.

DVD Studio Pro allows you to encode video, conduct complex authoring tasks, preview the finished product and burn DVDs. Video is encoded in MPEG-2 and audio is encoded in Dolby Digital — the two formats preferred for professionally mastered DVDs.

You can work with up to 99 video tracks and multiple language tracks. DVDs can also be customised to include slide shows, still or motion menus from layered Photoshop files or video clips, and embedded interactive links to the Web (metatags).

If you plan to use the software with Apple's new SuperDrive, or Pioneer's DVR-A03 (formerly known as DVR-103), you will be restricted to the DVD-5 standard. This is a single-sided, single-layer format that handles up to 4.7G of storage. By using variable bit rate (VBR) compression and AC-3 audio, you can squeeze over two hours of high quality video and audio onto a single disc.

No DVD recorder to date can burn dual-layer DVDs. The dual-layer format, known as DVD-9, is commonly used by movie studios to distribute feature films and can store about double the amount of DVD-5 information by distributing the data along two layers.

The DVD-R standard, which is about two years old, is supported by most DVD players sold today, but some older machines do not support DVD-R discs. A similar problem emerged when recordable CDs became popular; many CD-ROM and audio CD players are not able to play the discs.

A partial list of compatible players is available on Apple's Web site ([www.apple.com](http://www.apple.com)). It also lists some players known not to work with the SuperDrive.

Peter Blasina

- Pro** Tightly integrated hardware and software
- Excellent interface
- Cons** Steep learning curve, even for experienced users

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Online [www.apple.com.au](http://www.apple.com.au)

Price DVD Studio Pro, \$1,749

Final Cut Pro 2.0, \$1,749



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# Kylix

Every once in a while, a computer program comes along which bridges two seemingly distinct technologies in such a simple and natural way that you wonder why it hasn't been thought of earlier. Kylix is one of these. The concept is simple: this is Delphi for Linux.

Delphi programmers with a Linux bent will immediately grasp why this is at once novel and useable. For the rest of us, some explanation is required.

For years, Windows programmers have used Delphi to churn out applications ranging from games and accounting systems to real-time control software. It is a rapid application development (RAD) programming environment capable of producing complete enterprise applications. It provides a component suite, database accessibility and built-in report writing.

It is similar to Visual Basic and other RAD environments that allow quick screen building using a library of controls, and then associate actions to these. In Delphi, the underlying language used to implement these actions is Pascal, a graceful language that offers enumerated types, mathematical sets, simple file handling and other elegancies.

Borland has now turned its attention to the increasingly popular Linux, and has ported Delphi to this operating system, in a move which is possibly surprising. After all, every major Unix or Linux application has primarily been developed in C. Furthermore, the bulk of open source applications use ANSI-compliant C, ensuring that they can be compiled and run on most variants of Unix such as Solaris and HP/UX, not just Linux systems. In this sense, Borland's decision to release a Linux-specific programming language that uses Pascal is unique, to say the least.

However, it is one that makes sense. Linux is definitely growing in popularity as a desktop environment, and has evolved its own suite of windowed environments, such as Gnome and KDE. In addition, many Windows programmers are likely to want to experiment, at least, with Linux, and because it runs on standard PC hardware, it is easily installed.

There are two groups of people that will find Kylix valuable: Windows programmers (and particularly Delphi programmers) who want to get into the Linux world; and Linux people who want to get into programming. Just as the simplicity of Visual Basic helped many PC users to learn to write software, Kylix will be the

tool used by many Linux users to start developing software.

For Linux users, Kylix looks like a real Linux application and integrates cleanly with your desktop environment. A limited version of SuSE 7.0 is included in the packaging, although it runs harmoniously with any major Linux distribution, including Red Hat 7.2. The server edition of Kylix also offers built-in support for Apache and MySQL.

Delphi programmers will immediately feel at home in Kylix. It has the same control palettes layout, such as keyboard shortcuts, without looking like a quick and dirty Windows port.

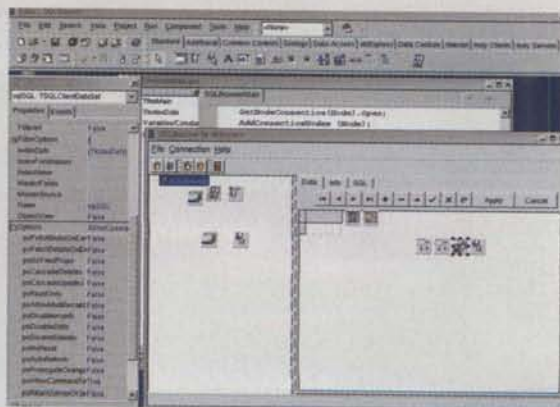
At the same time, Borland advertises that Kylix is Delphi-compatible. That's a carefully worded way of saying that Kylix isn't exactly 'Linux Delphi'. Obviously, there are parts of Delphi programs that can't migrate to Linux because of the differences between Windows and Linux, such as event logs, differing controls and various technologies including ActiveX and DLLs and Windows' API calls.

However, APC did want to test just how well Kylix could work with existing Delphi code. We loaded a program using Delphi 5.0 into Kylix and happily found that apart from a few components and attributes that didn't have Linux equivalents, the source code all opened up. This means that Kylix had no difficulty with Delphi's binary form file format.

However, the program could not be made to compile without effort. This is disappointing, because it is quite a simple program. The main problem was in the USES section, where Kylix complained that it could not find standard Delphi units such as Forms.

This is somewhat inconsistent, because Kylix did automatically add many required Kylix units to the USES section, such as QSystem. Given that Kylix did this, APC suspects Borland had intended that Delphi programs would cleanly and silently open up in Kylix with appropriate translations and modifications. The fact that Kylix did not delete or rename Forms is undoubtedly an oversight. It's not the only one, either; the online help is useful and comprehensive, but it is clearly a find-and-replace version of the existing Delphi documents. Do a search for delphi32.exe and you'll see what we mean!

Once you've written your program, can you email it to all your friends to



run? Sadly not; you need to deploy your application with any run-times or relevant libraries. This is standard practice, and Visual Basic programmers are used to the Package and Deployment wizard. Delphi programmers may well be used to InstallShield Express, which is available on the Delphi CD.

Kylix is no different; it requires specific versions of libraries like the QT toolkit, and also its own run-time library, which encapsulates its component suite. So, any good programmer should bundle up these run-time packages with their final application to ensure it will run on any system, without needing Kylix to be installed first.

Disappointingly, Kylix lacks any wizards or tools for making such a bundle. A text file can be found on the installation CD specifying which files can be redistributed, royalty-free, but apart from that, there is no real guidance or assistance.

This is a major blunder; after all, experienced Windows programmers won't want to have to manually package up Linux files repeatedly, and novice Linux programmers will find that although they can write and run programs easily, they have to undertake further learning before they can share their creations with family and friends.

David Williams

## Pros Robust and stable

Familiar environment for Delphi programmers

Server version supports Apache and MySQL

## Cons Can't open pre-existing Delphi code without modification

No package deployment tools

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# Cambridge SoundWorks PlayDock PD200

The rise of MP3s has seen plenty of portable MP3 players hit the market, but there are two main problems with these. First, many players don't take advantage of the main benefit of MP3s: their comparably small file size (roughly one twelfth of a CD). Standard memory for MP3 players is 64M, so you can only get about 11 songs on a player — not much more than a CD. The other hitch is that the players usually have no external speakers.

Creative has solved the first problem with the release of the Nomad Jukebox. It has a whopping 6G of storage, so you can store around 150 CDs' worth of songs, along with directories, playlists and libraries of available music. The device is larger than other MP3 players (about the same size as a discman) and has one drawback: the volume is not very loud at its highest setting.

An excellent add-on that addresses this problem is the Cambridge SoundWorks PlayDock PD200, a simple speaker system that docks to the player. It has a curved design and metal styling, and is perfect for parties, picnics or hanging out at the beach.

The curved front hides a left, right and bass speaker. The left and right speakers are powered at 7W RMS and the bass speaker is 15W RMS, so they won't replace your stereo at home, but they do produce good, loud sound.

The unit comes with a rubber 'glove' that slips around the Jukebox and helps to dock it securely to the PlayDock. This also prevents the player from banging on the PlayDock casing as it is being carried or moved around.

There are two connections from the PlayDock to the Nomad: a power lead and an audio lead. The PlayDock has built-in rechargeable batteries that run both the speakers and the docked Nomad Jukebox. The Nomad Web site boasts 10 hours of life on the batteries, but APC got only seven to eight hours before having to recharge.



The left and right speakers are angled outwards from the unit, which really helps to fill a room with sound. A 'wide' button also throws the sound out. The Nomad player has EAX technology, which is used to give ambient effects to music.

The PlayDock is a great addition to the Nomad Jukebox. It's a little heavy, so you wouldn't want to carry it around too often, but it's excellent for playing hours of ripped or downloaded music.

Darren Ellis

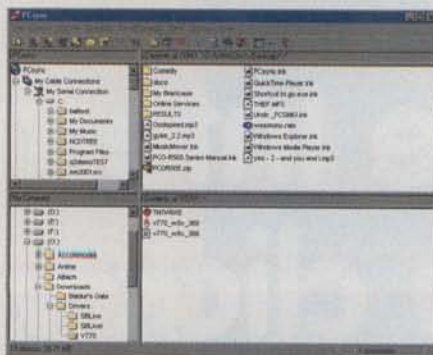
- Pros** Great audio  
Built-in rechargeable batteries
- Cons** A little expensive
- Contact** Creative Labs
- Phone** (02) 9666 6100
- Online** [www.nomadworld.com](http://www.nomadworld.com)
- Price** \$499

## PCsync 2.0

PCsync first appeared on the cable file transfer market last year as a lightweight alternative to its big brother, the venerable LapLink. The first version retains LapLink's elegant file transfer and synchronisation model, but reduced its footprint and price by relinquishing high-end features such as remote control, modem connection, file transfer scheduling, print redirection and online chat. It's perfect if you want fast and friendly exchange of files between desktop and notebook computers, without having to set up Windows' Direct Cable Connection.

Version 2.0 has stronger file transfer options and Internet connectivity, and its USB network cable expansion permits the connection of computers up to 6m apart. It can also be used to manage files over a LAN. The Surf Up utility allows you to access a designated shared folder using the Web browser of any remote computer over the Internet, as long as it is running PCsync.

Another new feature is PCmover, which allows you to automatically migrate the settings of a handful of common applications between PCs. This is a



powerful feature that isn't found even on LapLink, and is likely to be an absolute joy to those addicted to keeping their notebook and desktop PCs in total sync. In addition, the MusicMover provides a comprehensive, if unexciting, environment in which you can organise and transfer your digital music files.

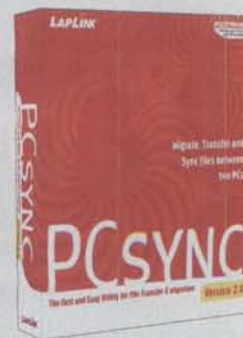
A separate upgrade (available from [www.laplink.com](http://www.laplink.com) for \$US19.95) adds support for copying the settings of up to 50 extra Windows applications.

Two-metre USB network and serial cables are included. The transfer times for a 10M test file averaged 25 seconds over the USB link compared with seven minutes and 55 seconds across the serial cable.

PCsync doesn't allow parallel cable connections. This is a serious disadvantage; every PC that has a serial port also

has a parallel port, and parallel is far faster than serial. Of course, USB is quicker again, but it's not always easier. The Windows network settings on APC's test system had to be adjusted to allow PCsync to recognise the USB cable connection. Luckily, the documentation helped us through the trouble spots. Parallel is a superior substitute when USB turns plug and play into 'plug and pray'.

March Stepnik



- Pros** Easy to use  
Solid file and setting synchronisation
- Cons** Establishing a USB connection can be tricky  
No parallel cable support
- Contact** Pacific Mobile Link
- Phone** 1800 129 535
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# I can...



## Reduced operating costs.

A Super Economy mode vastly improves operating economy without the definition sacrifices common to so many draft modes. It effectively quadruples output from both the black and colour cartridges.<sup>1</sup>

# ...fit even the tightest budget.

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A selectable function called Photo Optimiser is included in the printer control software. It automatically adjusts for defects in exposure, highlights and shadows, and prints accordingly with standard inks designed to optimise quality on low-cost plain paper.



Before.

After.

## High quality blacks at high speed.

The optional high capacity black ink cartridge uses 64 print nozzles for high print speeds. The selectable text smoothing mode goes up to 720 dpi to maximise text quality.



Optional BC-03 black ink cartridge.

# BJC™-1000SP

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Better Internet images.

Image Optimiser, a printer control software feature, automatically "corrects" low-resolution images up to the printer's maximum resolution.

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PhotoRealism produces colours between colours.

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You can...

# Canon



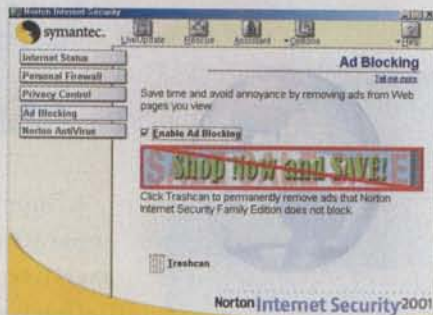
# Norton Internet Security 2001 3.0 Family Edition

Version 3.0 of Norton Internet Security 2001 aims for total online security. APC tested the Family Edition, which builds on the separate Norton Personal Firewall and the standard edition of the program by adding parental controls.

Installation is quite painless and this new version runs on Windows Me, whereas previous releases had trouble coping with changes to the TCP/IP layer of Me.

An application scan identifies common programs that are able to launch your dialup connection, such as your Web browser. If they try to make a break for the outside world, NIS pops up an alert. There were some limitations, but any program can be added to the list to prevent problems.

Improvements to the firewall include automatic blocking against sudden port scans and Trojan horse attacks. This provides a barrier for 30 minutes, during which you can add the suspect IP address to the program's blacklist of restricted zones. You can also identify computers for inclusion in your 'trusted zone'. This allows you to share resources and play games with computers on your local network while being protected from unauthorised access.



APC ran the firewall through the security gauntlet at Steve Gibson's Shields Up Web site ([www.grc.com](http://www.grc.com)), which confirmed that the test machine was surfing in stealth mode and rendered invisible to would-be intruders searching for an easy target.

NIS can also strip annoying banner advertisements and pop-up windows, providing an effective speed boost.

The Events Log and Statistics Page contain information about the sites you have visited and the computers that have been blocked. It also lists the Internet advertisements that have been removed. This useful information is unfortunately hidden in the Options menu.

Using Parental Control, parents can set up individual user accounts for each child. The easiest way to set restrictions is to select site categories to block from the predefined list, but you can also block specific URLs. This worked well most of the time, but for sites where the URL doesn't explicitly refer to its content, NIS let it through. You can add the URLs to the list of blocked sites to overcome this problem, but someone has to encounter the site first.

Overall, NIS Family Edition provides a well-crafted set of useful tools to keep your computer secure.

Mai-Lien Peck

- Pros** Simple installation and configuration  
Many useful features
- Cons** Advanced features are difficult to access and not well documented  
Site restrictions require customisation

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## Reduced operating costs.

Super Economy mode improves operating economy without the definition sacrifices common to many draft modes. It effectively quadruples output from both the black and colour cartridges.<sup>3</sup>

## 5 times the colour.

Optional PhotoRealism™ inks vary the saturation per dot. This produces up to five times as many colour combinations as conventional CMYK inks for better half-tones and less grain.

PhotoRealism produces colours between colours.



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## Automatic Image Improvement.

Advanced colour routines help define half-tones. Photo Optimiser automatically adjusts for defects in exposure, highlights and shadows and prints accordingly.



# BJC™-2100SP

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Canon Customer Care.

The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



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# Canon

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# Opera 5.0 for Linux

Version 5.0 of Opera for Linux doesn't have the solid feature set of Netscape or Internet Explorer, but it also lacks the lofty overheads of those behemoth browsers, both in terms of disk space requirements and system resources.

The available Linux download options are varied. Install packages for dynamically linked Qt systems and static environments are available. Opera is also offered in Red Hat 7.x RPM, Debian and plain TAR.GZ format. Comprehensive instructions are available on the Opera Web site for those who are unfamiliar or uncomfortable with installing Linux software.

APC installed Opera on a 150MHz Pentium with 32M RAM running XFree86 4.1.0 and KDE 2.11, as well as Gnome 1.4. It proved to be highly stable and there was much less disk swapping when loading Web pages, compared with Netscape.

Opera's browsing interface is clean and crisp. The free edition incorporates an advertising banner in the top right-hand corner of the screen, but for \$US39, users can register their copy and be ad-free.

By default, the HotList (a directory tree of all your bookmarks) is instantly avail-

able in a window on the left side of the screen, as is the history window. Drag and drop a page name into the HotList, and it is bookmarked. The HotList can do a search and supports wildcard searches. As with Netscape and Internet Explorer, you can drop bookmarks onto the browser window toolbar for single-click access to Web sites.

If you hold the right-hand mouse button down and click the left button, Opera will cycle back through Web pages, and if you hold the left button down and click the right-hand button, it will cycle forward.

There's also a simple built-in search feature that sends your request to any user-nominated search engine. The default setting is the fast and accurate Google. You can also submit requests to MP3.com and Amazon. By default, no email client is configured for the Linux version.

Opera for Linux can imitate Internet Explorer or Netscape agent calls, as some sites reject Opera's native agent requests.

Plug-in support for Opera is ready, although no plug-ins, such as ShockWave, are available at this stage. A separate download is required for some supported Netscape plug-ins, and will shortly be



available from the Opera Web site. Opera doesn't yet support Java.

Richard Main

- |             |   |
|-------------|---|
| <b>Pros</b> | Small footprint and low memory overhead |
|             | Can emulate Netscape and IE calls       |
| <b>Cons</b> | No email engine                         |
|             | Shortage of plug-ins                    |

**Contact** Opera Software

**Phone** N/A

**Online** [www.opera.com](http://www.opera.com)

**Price** Free

# Iomega QuickSync 3

Although Iomega is best known for its personal storage hardware, the company also dabbles in software — which, as you'd expect, is designed to make it easier to save your files onto an Iomega drive so you can get back to work after the smoke has cleared from your PC meltdown.

QuickSync 3 makes the process of automatically backing up your data much easier. Perhaps the best update is that this new edition is no longer Iomega-centric — it works with network drives, CD-R drives, tapes or whatever else you care to specify as your data dumping ground.

The Windows-only program is simple to set up. Click your way through the Explorer tree to set the drives or directories you want to back up, add them to a list, and then specify the drive location where the backup is to be kept.



Once the parameters of backup have been set — this extends to times, iterations and numbers of revision copies for repeat file saves — the program then makes an original backup of the specified data as the master backup. The setup process also allows file type exclusion, so potentially dangerous VBS or annoying TMP files can be excluded from the backup list.

Having lodged itself in Windows' Startup folder,

QuickSync 3 constantly monitors files in the specified directories — as soon as you save a changed version of a file, it's immediately copied onto the nominated drive.

However, although Iomega promises that the backup is totally seamless, APC found that saving files to a CD-R drive also requires packet writing software to run in the background. Additionally, switching off QuickSync requires you to

reinitialise the master backup next time to activate the program. This is something of a chore, especially for big backup jobs.

If the worst does happen and your data needs recovering, the backup files can be dragged and dropped into their normal place, without the hassle of complex decompression or relocation.

This does mean that for very large data loads, backup space may be an issue.

For the average home or small business user, provided that you can live with its quirks, QuickSync 3 is a very effective and practical piece of software.

Jeremy Torr

- |             |  |
|-------------|--|
| <b>Pros</b> | Affordable                             |
|             | Very easy to use                       |
| <b>Cons</b> | No CD packet writing software included |

**Contact** Iomega

**Phone** 1800 466 342

**Online** [www.iomega.com](http://www.iomega.com)

**Price** \$49



# I can...



Very smart monitoring of absolutely brilliant colours. All inks have a higher optical density to produce more vivid, natural looking colours. They are contained in separately replaceable transparent ink tanks, and each is separate from the print head. The printer driver alerts you when they are low. You replace only one colour at a time, and because the standard inks are optimised for low cost plain paper, you can keep operating costs down.



Light



Light

Smart monitoring system.

## ...do anything you want, brilliantly.

### 1440 dpi, variable ink drop sizes.

Quality is exceptional, even on low cost plain paper with resolution up to 1440 x 720 dpi, plus Drop Modulation Technology™ with variable ink drop sizes. B&W is enhanced using high optical density black pigment inks.

### Optional PhotoRealism™

Special inks vary the saturation level per dot (e.g. 33%, 67%) for up to 5 times as many colour combinations as conventional



CMYK inks. The result is smoother tones with vastly reduced grain.

PhotoRealism produces colours between colours.

**Brilliant Colour Inks**



### Better print quality, automatically.

Photo Optimiser adjusts for defects in exposure, highlights and shadows while Automatic Tone Control reduces the 'colour noise' from compact digital camera images. Image Optimiser prints low-resolution Internet images up to the maximum resolution supported by the printer.



### High speed printing.

Large print heads and bi-directional printing produce up to 4 colour pages per minute. An optional, dedicated black ink cartridge is capable of B&W speeds up to 9 pages per minute.<sup>2</sup>

Parallel and USB interface.

Both ports are built-in for Windows and Macintosh.<sup>1</sup>



Turn your printer into a 720 dpi colour scanner with the optional scanner cartridge, pictured left.

Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



# S400

colour Bubble Jet™ printer

You can...

# Canon

Canon® is a registered trademark and Bubble Jet, Drop Modulation Technology and PhotoRealism are trademarks of Canon Inc. Microsoft®, Windows® and Windows NT® are registered trademarks of Microsoft Corporation in the US and other countries. Apple®, Macintosh®, Mac® and Mac OS are registered trademarks of Apple Computer Inc in the US and other countries. All other trademarks are the property of their respective owners. 1. Printer driver support is provided for Windows® 95, Windows® 98, Windows® 2000, Windows® Me, Windows NT® 4.0 for the parallel port and pre-installed Windows® 98, Windows® 2000, Windows® Me and Mac® OS 8.1+ or 9.X using the USB port. 2. Print speeds may vary with the content of the document and the processing speed of the host computer. B&W print speeds require the optional BC-30c black cartridge. Specifications are subject to change without notice. Canon Australia Pty Ltd ABN 06 005 002 951. CS0618/3



# Give us back our bandwidth!

*Telstra's decision to slap an arbitrary 3G download limit on all its ADSL and cable subscribers has stunned Australia's emerging broadband community. APC has received an avalanche of complaints from disillusioned subscribers who have reached their own limit with Telstra. Now they want you to know about their disappointing broadband experience.*



Telstra is severely restricting educational opportunities on the Internet by limiting how much information Australians can access. Telstra is helping to make us dumber as the rest of the world moves ahead. Good job.

*Michael Sheppard*

To change its Acceptable Use Policy so soon after a heavy advertising campaign is not only unfair, it seems rather sneaky.

*James Bell*

I did not expect an Australian company such as Telstra to show such contempt for the people who made it a successful business. These changes are beyond the realms of good business ethics.

*Gregory Facer*

As a Telstra shareholder, I am sorely disappointed in Telstra's attitude to its customers. Internet development in this country will suffer as Web designers are crippled by the dismally small download allowance.

*Chris Delaney*

I am forced to use Telstra's cable because Optus is not available in my area. If I cancel my contract, I will waste my installation costs. This is tantamount to extortion.

*Mark Metcalf*

I was just starting to appreciate streaming audio and video. Alas, with the changes to my contract, I may not be able to enjoy the entire broadband experience. This issue is important for all Internet users, as other providers could follow suit.

*Suzanne O'Farrell*

The wider community has a right to know how Telstra is reducing its services, especially as the upcoming election

could decide the further privatisation of the company.

*Dene Smith*

I run a popular gaming site. New online games run at 50M per hour, which basically means Telstra users can play for one hour a day on top of any other usage.

*Daniel Soderstrom*

The service should have been improved, not limited.

*Nathan Lord*

Although I have agreed to abide by any changes to the acceptable use policy, this sudden and dramatic change to all customers seems unfair.

*Vincent Lui*

Austar's Chello service has a session limit with no megabyte limit. I might go back to them instead of paying the higher prices demanded by Telstra, who I feel are ripping me off.

*Gary Olive*

This appears to be a cost-cutting measure by Telstra. I am sure that many of us would not have signed up knowing that such a restriction would be imposed.

*Dave Read*

When I signed for Telstra's 'Freedom' plan, they implied that the word 'Freedom' applied to the amount of data you could download since the connection speed was capped (Telstra cable and ADSL users are limited to either a 256/64 or 512/128Kbps downstream/upstream connection). Now I am limited both by a speed cap and a data limit. There is no longer any 'Freedom'.

*Roger Stafford*

The limit is particularly unfair on ADSL users due to the nature of our connection. Approximately 0.5G of our limit is already used up by Telstra's choice of modem connection. Telstra also lumps ADSL and cable users in the same group, even though ADSL users have to pay more for their poorer connections.

*Chris Findlay*

Telstra has been misleading and deceptive in attracting customers to their broadband services by using terms such as 'unlimited', 'high-speed' and 'freedom plans'.

*Alex Colja*

The fine print on Telstra's so-called 'Freedom' plans: "If your use (including sending and receiving in the case of the broadband Services) in our reasonable opinion creates an undue burden to our network or degrades use of the network by other users, then we reserve the right to restrict the level or suspend your access to the Service, without prior notice to you... Your use of the Service will be deemed to create an undue burden to our network... if you transfer more than 3 Gigabytes a month."



▲ Telstra chief Ziggy Switkowski says goodbye to unlimited broadband.

Telstra says that 5% of users are abusing the network, but rather than remove these people, they have punished 95% of honest members. I plan to leave broadband.

*Andrew Bennell*

I admit that I have previously received warnings from Telstra about my usage, and have since changed my behaviour.



# I can...



A smart ink monitoring system alerts users when a colour is running low. There are individual transparent ink tanks for all colours separate from the print heads, significantly reducing operating costs and allowing you to replace only the empty tank.

## ...print at high speed, up to 1440 dpi.

### Advanced print head system.

The dual print head system meets the needs of even the most demanding user. Speed, plain paper quality, individually replaceable transparent ink tanks plus optional 6 colour PhotoRealism and high definition colour scanning. The BJC-6200 offers it all.

# I440

dpi plus Drop Modulation Technology

### Superior plain paper print quality.

Standard inks are optimised for plain paper. Resolutions go up to 1440 x 720 dpi. Drop Modulation Technology™ automatically adds variable ink drop sizes and the printer control software defines colour more in line with perceptions of the human eye.



Separate ink tanks.

### PhotoRealism™ with 6 ink colours.

Optional low density PhotoRealism inks may be used simultaneously with standard density colour inks. The 6-colour system delivers life-like reproduction, with smooth tonal graduations, especially on higher paper grades.



### Higher speed, blacker black.

A high performance engine with bi-directional printing results in monochrome text speeds up to 10 pages per minute and colour printing up to 7 pages per minute, making the BJC-6200 the fastest printer in its class.<sup>1</sup> The black cartridge employs pigment inks for a richer print density with greater water resistance.



Built-in parallel and USB interfaces for Windows and Mac.<sup>2</sup>



# BJC™-6200

colour Bubble Jet™ printer



An optional scanner cartridge delivers resolutions up to 720 dpi.

Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



You can...

# Canon



# Unbalanced books

As an accountant, I enjoyed the article 'Balancing the Books' (APC July, page 74). I have experience in the types of packages tested as I use both basic and mid-level enterprise systems. One area the article didn't address, and which vendors are reluctant to mention, is the 'hidden' costs of accounting software. Many medium-sized packages are designed so they can be installed only by a contractor and not by the purchaser. This is not unreasonable as data conversion can be tricky and a botched installation could cripple a business. However, the contractor-controlled installation has long been a controversial issue because it allows the installer to hold a figurative gun to your head and politely ask you to hand over large sums of cash.

I was recently involved in the installation of a package produced by one of the vendors in your review. The glossy brochure described a package that exactly fulfilled the organisation's needs at an acceptable price (\$2,450).

The package could not be installed by the company itself, and the agent asked for a \$1 for \$1 consulting fee on top of

the purchase price, but declined to give a firm quote. It also charged a \$150 per hour consulting fee, but I was assured that it was usual to charge a fee equal to the purchase price. This caused some shock, but the alternatives were no cheaper unless we dropped back to MYOB, which wasn't sufficiently secure or flexible.

In the end, software and installation cost \$11,000. Despite the advertising blurb, the program's built-in reports are useless. If I want custom-written reports I must either learn Crystal Reports or pay the agent to write them (at \$150 an hour). The agent charges some \$500 a year for support, and if you don't pay, it's \$150 an hour for telephone advice. I recently received a 'free' update from the manufacturer but haven't installed it because — you guessed it — only the agent can do it. Once again, the agent refused to provide a firm quote.

The open-ended installation arrangement is an invitation to commercial brigandage as there is no incentive to complete the job promptly and efficiently. Quite the opposite. As a rule, installation costs double whatever you budget for. My recommendation to anyone contemplating a mid-level package is to attempt to get a firm quote for the total costs of installation and to refuse to deal with an installer that won't do this.

**Bernard Morey**  
Bulleen, Vic

## Mouse trap

As a former candidate for carpal tunnel syndrome, I'd like to comment on 'Ergonomic mice' (APC June, page 112). I used to experience pain in my right hand and wrist from using a mouse. Then I switched to using the mouse with my left hand and didn't swap the buttons over. I've never gone back to using my right hand, and I haven't had any more wrist pain. A physiotherapist later explained that right-handed mice are actually configured wrongly. If you place your right hand in a curled position on the desk, your index finger sits on the right button,



not the left button. When you use a right-handed mouse with your right hand, you have to stretch and move your hand into an unnatural position to use the left button. If you swap the mouse to your left hand, your left index finger sits on the left mouse button with no straining. It might feel a little awkward at first, but you'll quickly get used to it, especially if you're experiencing pain in your right wrist.

**David Noakes**  
Alexandra Hills, Qld

## Instant isn't fast enough

The IT industry expects constant growth and staff shortages, while other industries experience redundancies or a proportional balance of supply and demand between personnel and positions. The constant development and integration of IT into other industries has made it a valuable resource, but the regular education system has been slow to adapt to the rapid advancement of IT. Universities may be largely responsible for most of the advancements, but they are not quite fast enough, nor do they have the resources to train the steady stream of IT professionals that the industry needs. That's where a lot of private firms have sprung up.

Well, here's a suggestion for APC. Why don't you do a First Take on all the training firms out there and provide readers with a run-down of some of the popular courses. You could detail the benefits, methods, costs, time, support and accreditation of a range of private and public training institutions. Of course, there is the old saying 'horses for courses', so you could also provide an overall view of future trends in the industry.

**Tad Chenu**  
Internet

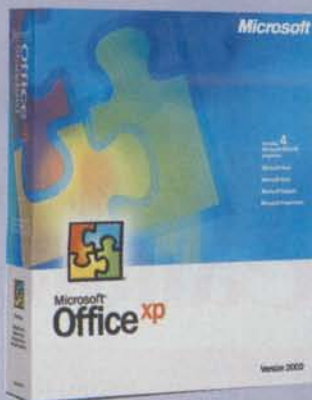
**Ed Note:** That's an excellent idea, Tad, and one we'll tackle in the near future.

## We need more ISPs

I am writing to highlight the lack of ISPs in regional Australia. Where I live, there are only four ISPs. The low number wouldn't

## Letter of the month

The most interesting letter sent in during the month of August will win its writer a free copy of Microsoft Office XP Professional, with the new 2002 versions of Word, Excel, Outlook, Powerpoint and Access. Worth \$699, this pack could be yours for free. The winner of this fantastic prize will be published in APC October. This month's winner is Bernard Morey.





# I can...



## Super fast, fast mode.

A special fast mode combines an extra large print head capable of up to 12 million ink ejections per second with four drive motors. The paper feed is up to 70% faster, and is enhanced by a 20% greater data compression ratio. This allows fast mode to print up to 15 monochrome pages (text), and up to 10 colour pages per minute.<sup>1</sup>

10

ppm colour

15

ppm mono

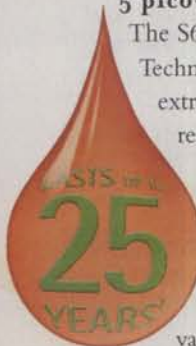
## ...print up to 15 B&W pages per minute.

### 5 pico-litre drops for 2400 dpi.

The S600 uses MicroFine Droplet Technology to precision-place extraordinarily small ink drops at resolutions up to 2400 x 1200 dpi.

### Better colours that last longer.

The S600 inks produce more vivid colours for improved reproduction on plain paper, and deliver sharper, blacker rendering of monochrome text. The ink range also offers vastly improved light fastness. In a simulated fading test, they have been shown to last up to 25 years using ISO standards for levels of acceptable fading when printed on Canon Photo Paper Pro.<sup>2</sup>



Original print



S600



Conventional

Image simulation

### Resolves speed vs. quality issues.

The S600 also features a special draft mode. Slightly slower than fast mode, it combines high speed, with ink conservation, while resolving the quality issue common to conventional draft modes. New head design and Precision Colour Distribution Technology improve colour consistency while producing high-density, high contrast prints and still achieving B&W speeds up to 12ppm.<sup>1</sup>



### Smart ink monitoring.

Inks are contained in separately replaceable transparent ink tanks, and each is separate from the print head. The monitoring system alerts you when they are low, so you replace only one colour at a time.

## S600

colour Bubble Jet™ printer



Parallel and USB interfaces are built-in for Windows and Macintosh.<sup>3</sup>

Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



You can...

# Canon



be so bad if the existing networks weren't coming under increasing pressure as more people connect to the Internet. As a result, speeds have become very slow. Australia's ISPs seem to have very little interest in providing services to regional Australia. This is a real shame, as there is a large market for Internet access here. The cost of setting up an ISP might be high, but one dialup number can provide access to a large number of users. The profits that ISPs make in the major towns and cities would more than cover the cost of setting up an ISP in most regional areas over time. I invite APC to contact a number of ISPs and ask them why they haven't made an effort to provide services to regional users. The only reason I can think of is that they really don't care about Australia and are really just discriminating against regional Australians. To ISPs that do provide services to regional Australia: keep up the good work.

**Nathan Pek**  
Pacific Palms, NSW

## Microsoft makes Linux look good

I faithfully moved straight to Windows 95 after having a glorious time using Windows for Workgroups. I was bitterly disappointed. Blue screens, freezes and fatal errors came with that upgrade, and the unfriendly user interface took a year to get used to. When Windows 98 came out, I again sought refuge, but there was no change. Two more versions of Windows later (98 SE and Me), and Microsoft still hasn't fixed all the errors. Now that Me has eliminated DOS, I find that old games don't run well (or at all), nor can I fix something if Windows stuffs things up! So I am left to wonder, is Windows XP worth all that money? Would it be better to change to the less-used Linux, even if it does take a while to learn?

**Matthew Strahan**  
Internet

## Monopoly madness

I have seen the occasional article in APC referring to Microsoft's greedy and monopolistic hold on the IT industry. It may be argued that there is competition in the operating system and office software markets, but it is obvious that there is no alternative that can equal this megalith.

I would like to encourage respected publications such as APC to use their considerable editorial powers to attack the ongoing efforts of Microsoft to demand ridiculous and unsustainable fees to use their software. After all, we are only paying for the right to use the software, without any warranty that the product will perform the tasks it claims to perform.

Microsoft assists us in working through the complexities necessary to operate the software at a moderate level of performance for a period of one year — but it does not guarantee the functionality of the software. This absence of responsibility is shown in most software products. Now Microsoft is to invade our privacy by demanding that we obtain an access code, allowing them to examine our system and lock the software to it. This is blackmail in the guise of anti-piracy. Please, call Microsoft to task over their shabby and greedy practices, and maybe it will be a more generous corporate citizen.

**Steven Eccles**  
Internet

## Who needs a PC?

In your iBook review (APC July, page 24) you state, "disappointingly, there is still no PC Card slot". The iBook has CD, AirPort, 10/100 Ethernet, FireWire, two USB ports, a 56k modem and video out. What does the iBook user want with a PC Card slot? All I have ever seen a PC Card slot used for is modem and Ethernet connections, or for a rare and expensive CD or Zip drive. Other devices use the USB ports. The iBook does not need a PC Card slot because it's got everything else. My new Dell laptop PC Card slots are filled with an Ethernet and modem combo card, items that are standard on an iBook. You also say it has an "awkward port layout". I'd kill to have my PC ports on the side of my Dell and not have to reach around the back to plug stuff in.

**Paul B Jones**  
Internet

## Make it X-Rated

I have been in the computer industry for the past nine years and have had numerous customers ask how to set up filters to block adult content. It would be easier to filter every site that contained adult content if it was required to use the .xxx domain, rather than place every single

site through a filtering process. The approval of .biz and .info are almost a laughing matter compared to the usefulness of .xxx. I don't understand why there wasn't more of a push to have it approved. In my opinion, it would make life easier for parents who are concerned about the type of material their kids view on the Internet.

**Tony Villano**  
Cumberland Park, SA

## Winning subscribers

**Winners of a Quicken Personal Plus 8.0 financial software package valued at \$129.95:**

PJ Pitsikas, Doubleview, WA  
F Newth, Sydney, NSW  
M Dutton, North Perth, WA  
E Northwood, Rozelle, NSW  
M Febo, Chatswood, NSW  
K Ryan, Singleton, NSW  
M Levitt, Bellevue Hill, NSW  
TM Wilton, Salisbury East, SA  
T Blackwell, Kaima Downs, NSW  
D Tirabassi, Wyndham Vale, Vic  
G Margelis, Maroubra, NSW  
S Pauley, Sydney, NSW  
D Evans, Stafford Heights, Qld  
P Gilbert, Chadstone, Vic  
N Allen, Terry Hills, NSW

**Winners of a Quicken ShareAnalyser financial software package valued at \$499.95:**

DW Eldridge, Sandy Bay, Tas  
JA Defaveri, Innisfail, Qld  
E Brooks, Wagga Wagga, NSW  
P North, Wangaratta, Vic  
G Hambour, Cumberland Park, SA

## Conditions of entry

These conditions apply to all competitions in APC August, unless specific conditions are provided with the competition. Instructions on 'How to Enter' form part of the Conditions of Entry of all competitions in APC August. Entry is free and open to all residents of Australia other than employees of ACP Publishing Pty Ltd (ACN 053 273 546), suppliers of competition prizes, their families and associated agencies. The contests close last mail August 17. Enter according to the instructions supplied with the individual competitions. The judges' decision is final and no correspondence will be entered into. No responsibility is accepted for late, lost or misdirected entries. All entries become the property of ACP Publishing Pty Limited, the promoter, 54 Park Street, Sydney NSW 1028. The prizes are not transferable or redeemable for cash. Any change in the value of the prizes occurring between the publishing date and the date the prizes are claimed is not the responsibility of the promoter. Winners will be notified and their names will be published on [apcmag.com](http://apcmag.com).

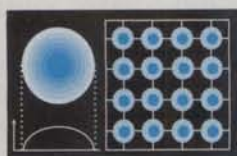


# I can...

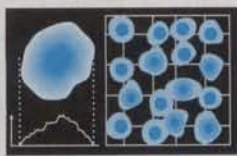


...print photos with **zero**  
discernable **grain.**

High precision dot control.



S800.



Lower-level technologies.

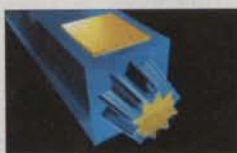
### Smaller, better ink droplets.

A unique Canon process called MicroFine Droplet Technology™ uses 4 pico-litre ink drops. A special star shaped nozzle creates



near perfectly round, centre weighted droplets for more accurate placement.

### Star shaped nozzle.



### SuperPhoto mode, 49 tonal levels.

In SuperPhoto mode the S800 can print up to 42 ink droplets per pixel. This allows the printer to achieve 49 tonal levels with zero graininess, even in highlights or gradations where dots are normally distinguishable.

### Extra large print heads with 6 separate ink tanks.

There are 256 print nozzles per colour on the print head.



Separately replaceable, transparent ink tanks and a smart monitoring system help maximise operating economy.

Separate ink tanks.

### 2400 dpi, super low density ink.

The S800 uses a 1200 dpi nozzle with interleaved printing to achieve 2400 x 1200 dpi. Special low-density inks are approximately 1/6 the density of normal inks. These have an apparent dot size equal to 0.67pl of regular ink.

# 2400

dpi plus Microfine  
Droplet Technology



Parallel and USB interface for  
Windows and Mac!

Canon Customer Care.

The one-year warranty is upgradeable  
to three years for a minimal  
charge, and is backed by Customer Care  
hot-line support. For more information  
call 1800 021 167.



# S800

colour Bubble Jet™ printer

You can...

# Canon

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*The Internet is getting faster, but how long must we wait  
for the beginning of the broadband revolution?*



## Jeremy Horey

Jeremy Horey is a solution architect at  
Dimension Data iCommerce.

He can be contacted at  
jhorey@ozemail.com.au.

*The views expressed in this column  
are not necessarily those of his employer.*

# The high-speed Net: hurry up and wait!

In Australia, 54% of the population now regularly uses the Internet. This puts us in sixth place after Sweden, Canada, the US, the Netherlands and Switzerland, according to a study published by Ipsos-Reid titled 'The face of the Web'.

Last year, 48% of the population were regular users. This means that in the last 12 months, the proportion of the population using the Internet has only increased by 6%. In the US, there has been no growth; the percentage of people regularly using the Net has remained constant at 59%.

The rate of growth in the numbers of people using the Internet is slowing. The total average amount of time spent online is still growing, but this is because people are becoming more experienced at using the Net, and are finding it more useful.

However, this pattern is likely to change. Average Internet usage will remain static or fall slightly as the number of Internet users starts to stabilise. Typically, the pattern of usage is that new users increase their online time as they become more adept. They reach a plateau, where they stay for a while, but then it tapers off.

This means that if you have a lot of money invested in ISPs, now is a good time to sell. It also means that the cost of Internet access might start to be discounted further. However, most importantly, let's hope that this will give ISPs and telecommunications companies a reason to promote broadband access. Broadband will produce the next big increase in Internet usage. It will encourage people to start using the Internet and also to use it more. On top of that, it will change usage from 'dialup' to 'always on'. In this environment, people will find the Internet more useful for casual things such as finding out which movies are playing or consulting the TV guide.

There are some hopeful signs. Telstra has equipped more than 500 of its

exchanges with ADSL capability. It is also now giving other telecommunications suppliers access to the local loop (the connection between the exchanges and people's houses).

Companies are also putting together broadband packages. Telstra BigPond has a series of services, some cable and some ADSL. It also plans to provide two-way satellite for remote areas. In addition, other providers are starting to offer ADSL-based broadband to compete with BigPond. For example, NEC's Nextep Broadband and Apple Communications are planning to offer services aimed at people who find that BigPond is either too expensive or doesn't meet their needs.

Faster access to the Internet backbone is only one part of broadband. The backbone needs to become faster and the servers that provide access to that backbone need to deliver their services more quickly. On top of all this, companies need to build Web sites and provide other services that make broadband really attractive. There are already a

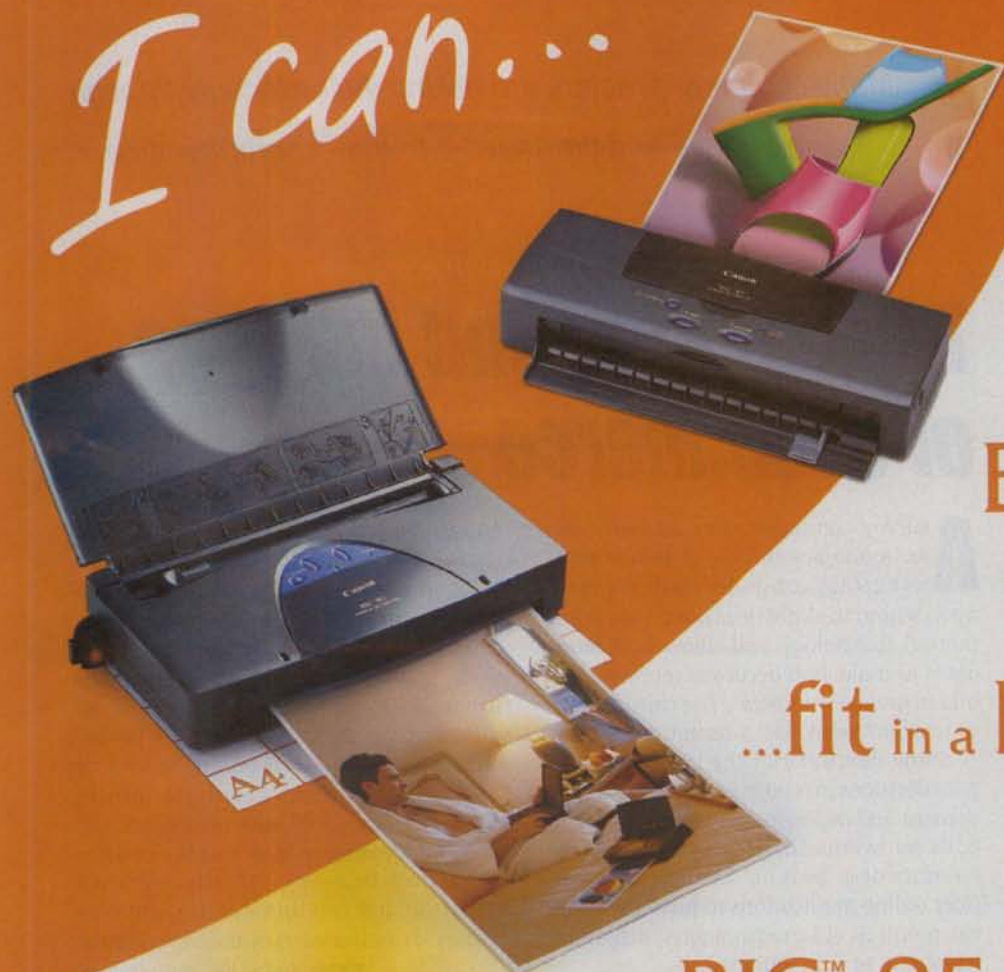
few providers that offer innovative services, but without enough viewers with high-speed access, it is hard for these new services to make money.

My prediction is that we won't see the mass adoption of broadband services for another two or three years. Over the next 12 months, we will see the new services that compete with BigPond broadband come online, and we will see the early adopters take up these services. There will be a mini-shakeout as some poorly run or poorly planned services fail due to over-optimistic predictions of take-up. Services will then slowly appear and the next wave of adopters will take up high-speed access. It won't be until the end of 2004 that the majority of Australian Internet users have high-speed access. ■

**It will be 2004  
before the  
majority of  
Australian Internet  
users have high-  
speed access.**



# I can...



**BJC-55.**  
Ultra small, ultra light, including Li-ion battery. Weighing only 900 grams, the BJC-55 is approximately 1/2 the size and weight of the BJC-85. Using the included battery and IrDA interface it is capable of cordless communications out of the box. An international AC power adaptor is also included.

## BJC™-55

colour Bubble Jet™ printer

# ...fit in a briefcase.

## PORTABLE PRINTER CHECK LIST

IrDA for totally cordless operation.



High speed black.



Four-colour print head.



Optional colour scanner cartridge for images, fax and OCR.<sup>1</sup>



Both fit into a briefcase.



USB interface included with both models.<sup>2</sup>



Drop Modulation Technology.



Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

## BJC™-85

colour Bubble Jet™ printer

**BJC-85.**  
Super powerful portable printer, international adaptor standard.

It fits easily into a briefcase, but offers desktop quality and flexibility. An international power adaptor is standard and a sheet feeder is built-in.

IrDA 1.1 plus parallel and USB interfaces are standard.<sup>2</sup> A long-life NiMH battery kit is available as an option.<sup>3</sup>

**Exceptional colour, optional PhotoRealism.**

Using standard inks optimised for plain paper, both printers automatically print high quality images using Drop Modulation Technology™ with variable ink drop sizes. The optional PhotoRealism inks offer exceptional photographic printing.

**High speed black and white.**

A four colour print head with resolution up to 720 x 360 dpi comes as standard. Both printers accept an optional dedicated black ink cartridge with 128 print nozzles for print speeds up to 5 ppm.<sup>4</sup>

You can...

# Canon

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## Leif Gamertsfelder

Leif Gamertsfelder is a member of Deacons' digital industries group and specialises in Internet-related legal issues. He can be contacted at [leif.gamertsfelder@deaconsllaw.com.au](mailto:leif.gamertsfelder@deaconsllaw.com.au).

*This article is intended to provide a general summary only and should not be regarded as a substitute for legal advice.*

*Many company directors are risking their esecurity through ignorance and the 'leave-it-to-the-experts' syndrome.*

# The benefits and burdens of ecommerce

A survey conducted over 20 years ago on management use of information technology concluded that "for those upon whom the light does not break, information technology will allow bad managers to make bad decisions more quickly and in greater numbers". The conclusion is as relevant today as it was in the 1980s.

Some directors run the risk of making poor decisions in relation to the rapid development and deployment of online applications by overlooking esecurity. Some see esecurity as a 'beat-up' because they consider online applications to have the same risk profile as older technologies such as the telephone or fax. Others are uninterested because it is a cost that makes ecommerce projects less attractive. The upshot is that many directors are paralysed by ignorance when it comes to esecurity.

The US government is aware of this and has introduced draft laws that will elevate esecurity issues to management level and force managers to inform themselves of the risks.

Australian management should follow suit, because their companies face very real esecurity risks. Ajoy Ghosh, a member of the National Office of the Information Economy's esecurity coordination group, believes that approximately 80% of .com.au Web sites are vulnerable to intrusion and control by hackers, and that fewer than 25% of Australian companies would comply with NOIE esecurity policies by the end of this year. These figures clearly indicate that esecurity risks are very real.

If directors fail to take reasonable steps to ensure that these risks are managed appropriately, their online applications could serve as an entry point for a hacker to compromise internal systems or act as a launching pad for attacks on trading partners' systems. They could also be fooled into processing bogus transactions and allow customers to repudiate or deny having

entered into contracts with the company.

These types of scenarios all have one thing in common: they could cost companies a significant amount of money, through either direct costs or damage to their reputations. In this context, damage to a company's reputation can be more significant than direct costs; just ask the ex-directors of the ISP formerly known as AusNET. After a minor hacking incident in the 1990s that would have involved a relatively small amount of money to clean systems and increase security, AusNET reportedly lost two-thirds of its client base within a matter of months. Apparently,

these clients lost faith in AusNET's security and refused to do any further business with the company. Directors have legal duties to ensure that they steer their companies clear of these risks on the information superhighway.

The catalogue of laws that impose a duty on a director to take reasonable steps to ensure esecurity issues will

vary from case to case, but may include the corporations law, ASX listing rules, negligence law, the data security provisions under the new privacy laws, and contract law. Insurance policies may also impose the 'reasonable steps' requirement on directors as a precondition to making any claim under a D&O policy.

In order to minimise the risk of breaching these obligations, directors need to take a hands-on role in managing projects that involve the development and deployment of online applications. Directors do not need to become esecurity specialists, but they must understand the basic concepts and ensure proper management of the risks associated with business operations.

Directors must not abdicate this management responsibility by falling victim to the 'leave-it-to-the-experts' syndrome. This is the burden that directors must shoulder when pursuing the benefits of ecommerce. ■

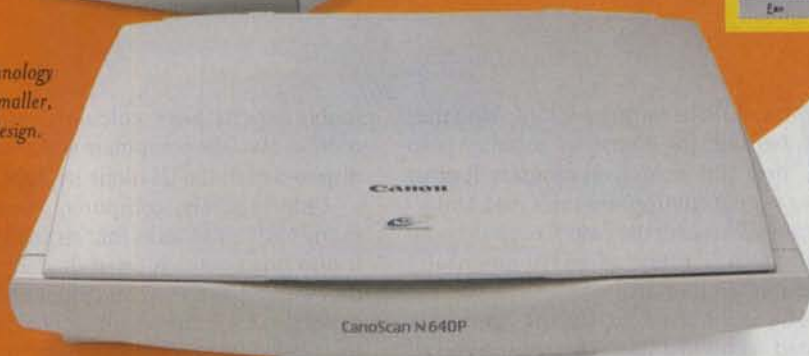
Damage to a company's reputation can be more significant than direct costs.



# I can...



LIDE technology allows a smaller, sleeker design.



Easy to use.  
The ScanGear Toolbox lets you select functions and the final destination of your scan such as printer (copy), e-mail program, fax, or others,<sup>1</sup> and automatically makes settings for you.



## Getting started is easy.

Your scanner plugs directly into the parallel port, or hooks up as the middle link between a printer and your PC. CanoScan™ Setup installs the included software, and you're ready to make your first scan with Windows 95/98/Me/2000/NT 4.0.

## Introducing LIDE.™

LIDE (LED Indirect Exposure) changes the way scanners work and their price/performance ratio by eliminating the need for costly, complex mirrors. Yet it maintains image quality and colour clarity in two super slim, sleek scanners.

The CanoScan N340P (300 x 600 optical dpi) and CanoScan N640P (600 x 1200 optical dpi).



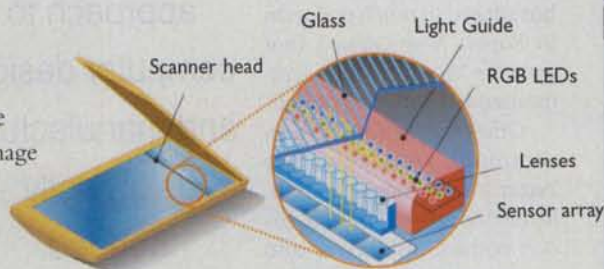
# ...get a colour scanner at an amazingly low price.

## Full software suite, 42-bit colour input.

The CanoCraft CS-P software works for both stand-alone image acquisition, and as a TWAIN driver for other applications. Advanced controls allow various pre-scan settings such as

selecting the scan area and selecting up to 42-bit colour input.

The software package also includes ArcSoft PhotoStudio 2000 for photo-editing and Caere OmniPage Pro for converting scanned documents into editable text data, plus a CD ROM with user's manuals.



CanoCraft makes high quality colour easy.

**42**  
bit input

CanoScan™  
**N 640P**  
600 x 1200 dpi



Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

CanoScan™  
**N 340P**  
300 x 600 dpi

You can...

# Canon





## Suzanne Fraser

Suzanne Fraser is a writer and sub-editor for *Australian Personal Computer*. She can be contacted at [sfraser@acptech.net](mailto:sfraser@acptech.net).

*The computer industry likes to portray itself as cutting-edge. Why, then, is its approach to the environment so old-fashioned?*

# Coming clean

**Y**ou could be forgiven for thinking that because the computer industry is so new and focused on progress, it must have a great environmental record. Unfortunately, this isn't the case. Computers are built from a range of environmentally damaging materials.

The gold used in circuit boards is mined using cyanide. The risks involved in this kind of mining are high. Australian mining company Esmeralda became infamous in February last year when it spilled 100,000 cubic metres of cyanide into the Szamos and Tisza rivers in Romania. The rivers are now dead, and will take six years to regenerate.

Copper, another metal that is mined using pollutants, is also used in computer circuitry. BHP's giant copper mine, Ok Tedi, has caused so much pollution in Papua New Guinea that even the World Bank has recommended that it be closed.

Other substances used in computer production are hazardous to human health. Semiconductors, printed circuit boards, disk drives and monitors all use dangerous chemicals such as flame retardants and heavy metals that can damage the central nervous and endocrine systems. There is also evidence of increased rates of cancer in workers involved in chip manufacturing.

If manufacturing computers causes so much damage to the environment and workers' health, one solution would appear to be recycling. We all know computers become obsolete extremely quickly, so rather than extracting more raw materials and manufacturing more components, wouldn't it be better to recycle the materials already used in computers? After all, the problems with dumping computers in landfills are also daunting. Mercury, lead and other heavy metals leach into groundwater and drinking water, which is a serious danger, and the PVC plastics used in computers aren't biodegradable. Sober-

ingly, experts have calculated that 315 million obsolete computers will need to be disposed of in the US alone by 2004.

Unfortunately, computers contain so many toxic substances that recycling them is also hazardous. A Swedish study found that workers in a recycling plant had levels of dangerous flame retardant chemicals in their blood 70 times higher than the levels found in hospital cleaning staff. Recycling merely moves the toxins around and increases human exposure to them. Questions have even been raised about the impact of these toxins on people who use computers regularly, such as office workers.

A new approach to computer design and manufacture is urgently needed. Some features it must include are:

**A new approach to computer design and manufacture is urgently needed.**

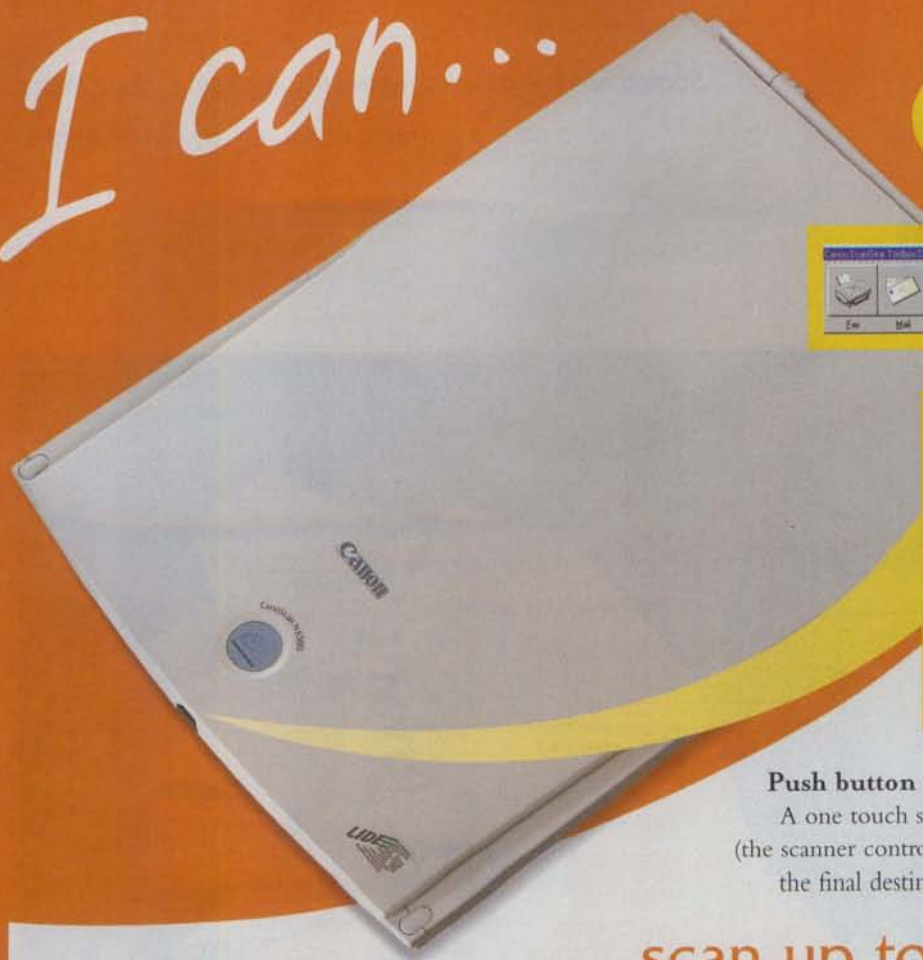
- Minimising the use of materials that damage the environment through mining or manufacture;
- Phasing out as many toxic chemicals and heavy metals as possible in the production of computers;
- Designing computers that are readily upgradable to minimise obsolescence; and
- Designing computers with safe decommissioning in mind.

When manufacturers are required to meet environmental and health guidelines, alternatives to toxins and polluting processes can be found. For example, pressure to eliminate the use of flame retardants has led to the inclusion of metal shielding in computer housings. Similarly, a safe cleaning method for chips has been found that uses carbon dioxide instead of solvents.

A clean computer industry isn't impossible — all that's required is the will to make it so. It's up to consumers and governments to force computer manufacturers to live up to their image as modern and forward-thinking. ■



# I can...



## Push button simplicity, unconventionally silent.

A one touch scan button activates ScanGear Toolbox CS (the scanner control software). It lets you select functions and the final destination of your scan such as colour printout (copy), e-mail program, fax, or others.<sup>3</sup>

...scan up to

# 600 x 1200 dpi,

## with USB for Windows and Mac.

# 42 bit input

**High powered scanning with LIDE.** Patented LIDE™ technology delivers optical resolution up to 600 x 1200 dpi with 42-bit colour

input. ScanGear CS and universal TWAIN driver for other applications offer direct scanner control.



## Plug'n play USB for Windows and Mac.

The USB interface is compatible with Windows 98/Me/2000 and Mac OS 8.5 or higher.<sup>1</sup> And, because the scanner is powered directly through the USB cable, it does not need a separate AC cable.



## "Z-lid", advanced OCR.

This special lid simplifies book scanning and OCR with the bundled Caere OmniPage Pro<sup>2</sup> converting scanned text into editable data.

## Edit and store photos easily.

ArcSoft PhotoStudio 2000 is an easy to use image editor, and ArcSoft PhotoBase creates photo databases. Electronic manuals for Windows and Mac are included.



# CanoScan™ N 650U

**Canon Customer Care.** The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



You can...

# Canon

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*Sometimes it is easier to extract blood from a stone than it is to have a warranty honoured. By Fiona Angus.*

## Warranty woes

**I**t can be easier to extract blood from a stone than to get some companies to honour a legitimate warranty.

Entering the maze of after-sales support can be a hellish experience when a company doesn't want to keep faith with its original agreement.

Some warranties contain conditions that are so unusual, even the most well-informed consumer can misread the fine print. Only later do they discover they aren't eligible for help.

Technology companies have set up some of the best after-sales support operations in the world. After all, customers are likely to upgrade their computer every few years, and the brand they use today will influence what product they buy tomorrow.

Two APC readers recently had their minds made up for them.

Dear APC,

My Seagate hard drive stopped working with nine months of warranty still to run. I sent countless emails to Seagate's support centre in Singapore, all to no avail. After several weeks, I received a 'return authorisation' and sent the drive off, but Seagate promptly returned it without fixing it.

The support centre staff told me that, based on the internal manufacture date, it was two days out of warranty. For those not in the know, Seagate calculates its warranty period from the date of manufacture. If it takes six months for a hard drive to get from the factory into your hands, then your warranty will be seriously curtailed. When I questioned Seagate's staff about this, they said that it was their mistake and agreed to replace my hard drive immediately. After waiting two months, I referred the matter to the Queensland Office of Fair Trading. More than three months after I had first contacted Seagate, I received a new hard drive, with no apology or explanation. Seagate has obviously worked hard to make a good product. It is unfortunate that its good name is marred by such pathetic service and support.

*John Mackay  
Magnetic Island, Qld*

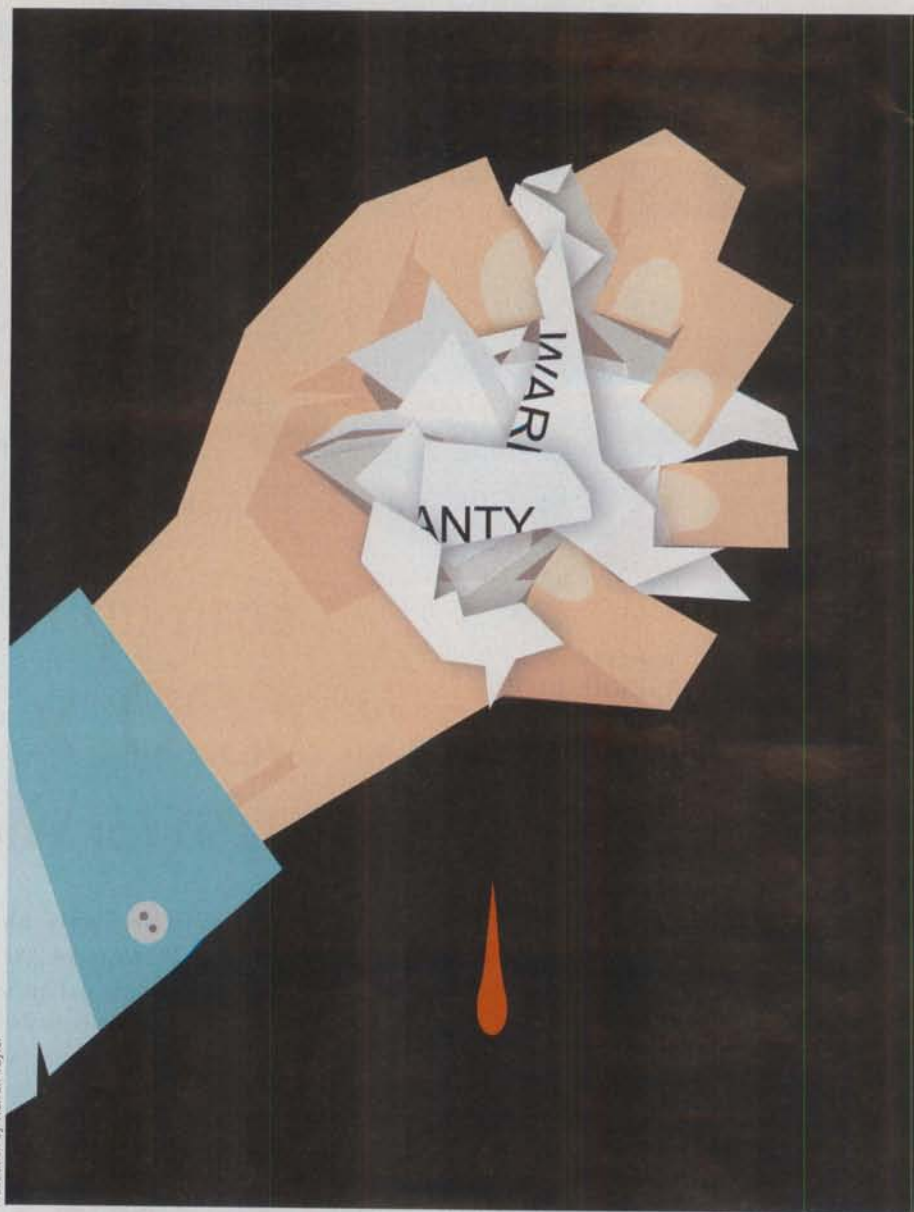


Illustration by Warren Taylor

A warranty that begins on the date of manufacture? Not according to our definition of fair trading. APC forwarded John's letter to Seagate's Australian office and received this reply from its top man:

Dear APC,

Seagate takes every opportunity to ensure prompt and efficient technical service and support for its customers. In the 24 hours following Mr Mackay's first contact through [www.seagate.com](http://www.seagate.com), Seagate responded and outlined the

next steps to process his claim. Once Seagate's distribution centre received Mr Mackay's drive from his chosen reseller, a replacement drive was shipped within 48 hours. Unfortunately, between these two events, there was a communication oversight between the local reseller and Seagate that delayed Mr Mackay's replacement. Seagate recognises this and regrets any inconvenience caused to Mr Mackay, and steps are being taken to ensure a delay of this nature does not occur again.



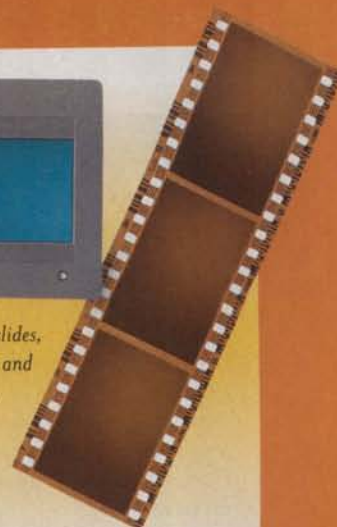
# I can...



Push for film scanning



Scans 35 mm film in slides, and strips in positive and negative format.



## ...scan trannies with a built-in film adaptor.

### Easy to use, with USB.

The CanoScan™ D660U solves diverse scanning needs simply. No adapters or add-on kits. Everything is built-in, and is available with the push of a button. ScanGear Toolbox CS lets you select the final destination of your scan such as printer, e-mail program, fax, copy or others.<sup>1</sup> Or, direct driver control lets you adjust scan size, resolution, and other parameters. The USB interface connects to either Windows 98/Me/2000 or Mac OS systems.<sup>2</sup>



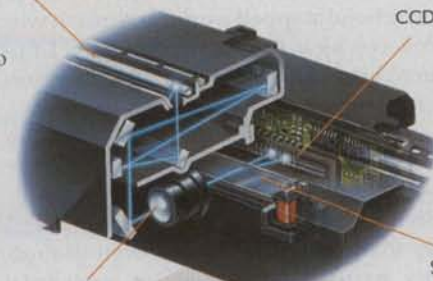
### 600 x 1200 dpi, 24-bit colour input.

Photo print and text scanning resolution goes up to 600 x 1200 optical dpi with 42-bit colour input capable of capturing more than 4 trillion colours. Data can even be software enhanced to 9600 dpi.<sup>3</sup>

Push for photo scanning



Lamp



### Superior 35 mm film scanning with VAROS.™

The scanner cover includes a built-in back light for film that reaches an extra large CCD sensor. Much like high-speed film, it has a relative light sensitivity up to 4 times greater than many 1200 dpi CCDs. It uses Canon's innovative two-pass VAROS scanning technology where the second pass is refracted by half a pixel. It activates automatically at resolutions greater than 600 dpi, capturing data that could be lost on a lesser scanner. The result is 1200 x 1200 optical dpi film scanning in less space and at lower cost.



### Edit and store photos easily.

ArcSoft PhotoStudio 2000 provides tools for editing photos, and ArcSoft PhotoBase creates an electronic photo database. Also included are Caere OmniPage Pro for Optical Character Recognition,<sup>4</sup> plus Adobe Acrobat Reader and PDF manuals for Windows and Mac.

Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



You can...

# Canon



## CanoScan™ D 660U

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## Your Letters

Have you ever had to rant and threaten just to get a company to honour a legitimate warranty? Or has a kind soul helped you even when they didn't have to? We want to know how shops treat you *after* they've taken your money. Here is a taste of what APC readers have to say.



Dear APC,

I would like to report that lomega has abused its customers. I judge a technology company by the way it supports its older products. Respected companies like Epson, Seagate, Fujitsu, IBM, Maxtor and Hewlett-Packard all do this, but not lomega. I purchased a Clik mobile drive in August, 2000. It is still under warranty, but now statements in lomega's forum indicate that it does not intend to produce up-to-date drivers for the product. This is unforgivable. I can understand that lomega has a new product on the market that makes the Clik nearly obsolete, but to no longer provide support is disgraceful. I invested \$600 in the product, and I have told many people how great it is and what a good brand lomega is. Now I have egg on my face and these people are treating me as a joke. This situation will lose lomega a lot of customers — myself for one.

**Brian Zarth**  
Sydney, NSW



Dear APC,

I read with astonishment a letter (APC June, page 62) from a retailer complaining about customers who do their research before purchasing a computer. Yes, I'm one of these people who does their homework before purchasing a computer as I want the best deal for my dollar. Does this phantom dealer (hiding behind the old 'name and address withheld') walk into a business to purchase something and pay the first price asked? I think not. And as for delaying repairs on someone's computer to punish the client? Shame, shame, shame. I believe that APC has a duty to protect its readers and give out the address of this business so that people can give it a miss, and those whose computers are being held up can report the business to the Department of Fair Trading. Mate, you deserve to be closed down.

**Gary Greenhill**  
Proserpine, Qld

Upon his first contact with Seagate, Mr Mackay's drive was still within warranty. Following the delay, this warranty was extended to cover his replacement and to meet Seagate's original commitment. Seagate's warranty policy has always received positive feedback and meets, or exceeds, industry standards. A warranty takes effect after a product has been shipped to its distributor, and after a set period designed to allow time for a product to reach a reseller or end user.

**Dale Townsend**  
Country manager,  
Seagate Australia and New Zealand

Another reader found himself out of pocket after discovering he was not covered by a warranty after all.

Dear APC,

APC readers should think carefully before buying a Canon printer. One Canon 'feature' could be to their detriment. Canon sells its printers with the printhead as a detachable item, unlike my Epson, which has a built-in printhead. I thought this was a good feature, because if there was a problem with the head it would be easy to replace. Eleven months after I bought a BJC 6000, the printhead stopped working. Since it was covered by a 12-month warranty, I figured I could just take it to the Canon service centre and all would be well.

Unfortunately not. The staff at the support centre told me that as the printhead is detachable, it is considered a consumable and is not covered by the warranty. So now, even though my printer is within its warranty period, I am expected to pay \$75 for a new colour printhead. I find it amazing that Canon can exclude parts of its printer from warranty coverage. Is this the way a large, reputable company like Canon should treat its customers?

I would also like to point out that my five-year-old Epson is still going strong on its original printhead.

**Remi Broadway**  
Broadbeach Waters, Qld

Remi had to decide whether to replace the printhead or just buy a new colour printer. We forwarded his letter to Canon to find out what its representatives had to say.

Dear APC,

Most Canon Bubble Jet printers incorporate user-replaceable printheads separately from the ink tanks. This is a significant advantage (and not a "detriment"), designed to ensure that

Canon Bubble Jet printers maintain the highest possible printing quality by making the printhead a user-replaceable 'click-in' component. The BC-31 printhead in this case is designed to produce around 3,000 pages at approximately 7.5% ink coverage, assuming that genuine Canon inks are used. Replacing fixed, permanent printheads similar to that fitted to Mr Broadway's other printer requires service technicians, transportation and substantial 'down time', costing considerably more than Canon's user-replaceable printhead system. Canon's system is designed to be easy, with low-cost, individual ink tanks, replaced only as they become empty, fitted to the majority of Canon's printers. These cost around \$20 each. This represents a significant cost saving even with the occasional need to replace the printhead. As a result, customers are way in front when consistent print quality and running costs are considered.

Canon covers its Bubble Jet printheads, a user-replaceable consumable item, with a three-month warranty, and is in no way backing away from its warranty obligations, which cover the entire printer, other than consumable components, with a 12-month warranty. I would ask Mr Broadway to consider the cost saving and print quality benefits of the Canon system when purchasing consumables. Canon is simply trying to offer its customers a better printer that delivers consistent print quality over the long term.

**Glenn Stubbs**  
Product manager, Canon Australia

Remi considered this letter and the advice of Canon's support staff, who told him that the printhead was only expected to last for three to five cartridge refills. Under his current usage patterns, he calculated he would need to replace the printhead every 11 months. His decision: "I'll buy a new Epson printer and cut my losses."

**What do you think of the way Seagate and Canon treated John Mackay and Remi Broadway? Tell us if you've managed to force a recalcitrant company to honour a legitimate warranty, or if a warranty turned out to have conditions you didn't know about.**

Write to [service@acptech.net](mailto:service@acptech.net) or  
Service & Reliability, APC,  
PO Box 4088,  
Sydney NSW 1028.

Letters may be edited for length or clarity.



# I can...



**Edit and store photos easily.**  
ArcSoft PhotoBase creates electronic photo albums.  
ArcSoft PhotoStudio allows easy image editing.



...scan up to

# 1200 x 2400 dpi.

**Semi-professional 1200 x 2400 dpi.**  
Canon's patented LIDE™ Technology is a flatbed scanning breakthrough that changes the scanner price/performance ratio.

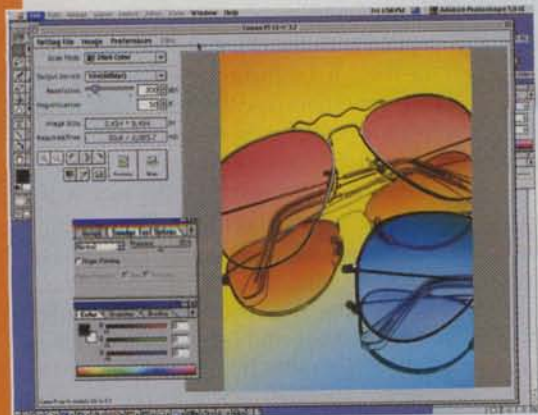
The CanoScan™ N1220U, with 42-bit colour input, demonstrates the evolution of this technology, delivering "semi professional" quality in a super slim design.



**42**  
bit input

**Simple, professional quality software.**

The one-touch scan button activates ScanGear Toolbox CS to select the destination of your scan such as colour print out (copy), e-mail program, fax or others.<sup>1</sup> ScanGear is also a universal TWAIN/ Plug-in driver that offers direct control for pre-scan settings or enhanced resolution up to 9600 dpi<sup>2</sup> for applications such as the bundled Adobe Photoshop LE, a limited edition edition of the world's most popular image editor.



**"Z-lid", advanced OCR.**

This special lid simplifies book scanning and bundled Caere OmniPage Pro<sup>4</sup> OCR converts scanned text into editable data.



Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

**Plug 'n play USB for Windows and Mac.**

The USB interface lets you plug in or disconnect your scanner at any time and, because it is powered through the USB cable,<sup>3</sup> the scanner does not require an AC cable.



## CanoScan™ N 1220U

You can...

# Canon

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CS0618/11



# External Zip drives

**D**espite the many attractions of CD-R, it seems that Iomega is still selling Zip drives and disks by the bucketload. The reason for this is that many CD-R drives appear more complex and daunting to novices, and some organisations and educational establishments also specify Zip as the super floppy format of choice.

Price Watch decided to test the waters by ringing 10 major suppliers, and was surprised and impressed by the level of service offered by some outlets — First Technology Co and Adelong were particularly noteworthy. We were equally astounded that major outlets such as E-Store and City Software were apparently so poorly staffed that we never got to speak to a human, despite waiting on hold for over 10 minutes. That's long past the point at which most shoppers will hang up and dial the competition.

The question we asked was very straightforward: "I want an external Zip drive — what do you recommend?" It's probably a very common question, considering the confusing variety of Zip drives available, especially when you consider the number of original 100M USB models that are still around.

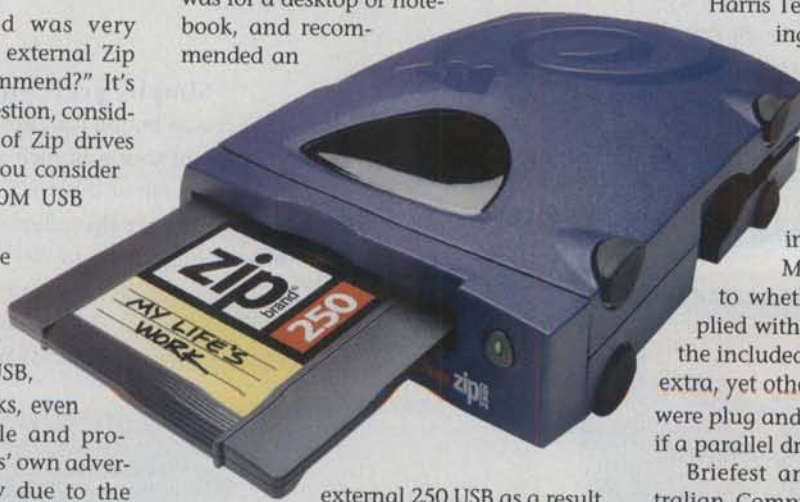
Almost all retailers gave the Zip 250 USB drive the thumbs up. Surprisingly, none mentioned the recently released, self-powered Zip USB, or the new U-format Zip disks, even though these were available and promoted in many of the retailers' own advertisements. This was possibly due to the higher price.

Reasons for the standard USB recommendation ranged from the simple argument that "it's faster at data transfer", to the excellent advice from Trinity, which suggested that notebook users may find

printer ports becoming rarer in future models as USB becomes more ubiquitous. Indeed, there are still some older parallel models lurking on the shelves, and they are both slower and more difficult to connect than the USB variant. APC's advice is to go for USB every time.

All the shops were asked what the advantages and disadvantages of external Zip drives were, compared to the internal ATAPI units. Several seemed very sketchy on product and usage details. Details such as read/write speeds, backward compatibility between the 250M drives and 100M disks (they can read and write them, but slowly), and alternative options were quickly glossed over by most.

The reassuring exception was Trinity International, which asked which platform was being used (Mac or PC) and whether it was for a desktop or notebook, and recommended an



external 250 USB as a result.

As mentioned previously, both Adelong and First Technology went much deeper into user requirements, and on being told that backup was the main purpose, suggested looking at external USB CD-R drives as an alternative. Both agreed that while

*Zip drives and disks are still selling well, but there can be big differences in price.*

## About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on the companies' Web sites.

Prices and specifications provided here are as quoted by retailers; while we assume these are correct, we cannot accept responsibility for errors or omissions.

the speed of writing was generally slower for CD-R, it was much cheaper in the long run and almost universally readable on all PCs, without the need for any external drives.

Harris Technology offered the surprising rationale that USB was better because it didn't tie up a printer port (despite the fact that the parallel drive includes a pass-through port), with no mention of USB's substantial advantage in read and write speeds.

Many stores seemed unsure as to whether or not a disk was supplied with the drive (it is). Some cited the included software on CD as a useful extra, yet others (PAW) claimed the units were plug and play — clearly not the case if a parallel drive was chosen.

Briefest and least helpful was Australian Computer Online, which merely said that there was no difference between USB and parallel, they were both plug and play, and they were both easy to use. Only First Technology and Adelong suggested a couple of Web sites that would help users to source product details and performance specifications — obviously a real boon to the total novice.

The price difference for disks is also quite pronounced, as our survey of 250M disks indicated.

Overall, it seems that buyers looking for an external drive can find both a bargain price and good advice if they take the time to ring a dozen or so suppliers. As the chart shows, raw prices vary by up to \$90, or over 20% of the total cost. However, if this means that you risk getting the wrong tool for the job, the saving could well be wasted. ■

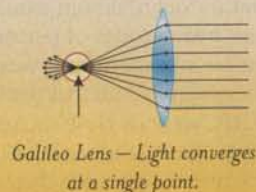
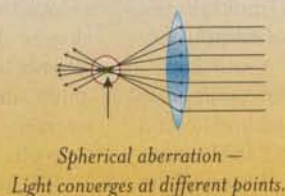
Company	Contact	USB 250	Parallel 250	Zip 250M disk
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Forté Computers	1300 368 922	\$420	N/A	\$31
Harris Technology	1300 139 999	\$410	\$418	\$38
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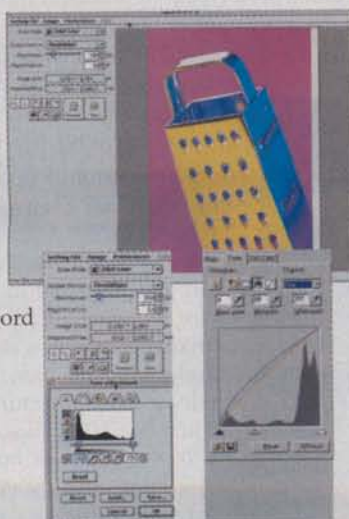
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The 'first' PC brought about a slow death for Australia's only popular local computer.

## Not to Bee

**T**wenty years ago this month, APC claimed to have performed "the world's first bench test" on the IBM PC in New York. APC may not have realised that its 'open' design would underpin the next two decades of personal computing, but we still thought it was "a knockout". The glossy pictures in the December issue of APC were as close as Australians could get to the legendary 'first' PC. IBM would not reveal when (or if) the PC would be available here. Instead, we embarked on an odyssey into obsolescence with our own brand of proprietary microcomputer — the Microbee.

This first 'Bee' was released soon after the IBM PC and evolved from a kit-based \$100 circuit board made by Sydney company Applied Technology. It was sold as a bag of components that you had to assemble yourself (or pay the shop \$50 to do it for you). It had a Zilog 2MHz Z80 processor, 16K of RAM, and if you bought a special cable and a cassette deck, you could even use it to store files.

The Bee was puny compared to the IBM PC's 4.77MHz Intel chip and up to 256K of RAM, but at \$399, it was about \$4,000 cheaper. Add to this a friendly Unix-style interface, and the Bee was an instant hit. Applied Technology changed its name to Microbee Systems and started mass production in its West Gosford factory.

Microbee founder Owen Hill shot to microcomputing fame. He espoused a philosophy of "hanging back" from the "leading edge" of technology and offering "plain" and inexpensive machines. It worked. Sales went through the roof after Hill won contracts to supply a number school systems with Bees. A chain of Microbee Computer Centres opened around the country and thousands of Bees were exported to Scandinavia and Russia. Hill even beat IBM to supply computers to BMW. With several hundred thousand Bees in use, Hill believed people would soon want to upgrade. "Non-obsolescence" is one of the major philosophies behind the Microbee,

company advertising stated. Yet the newer models were not very different from the first models. At the same time, Australians were being seduced by the feature-packed IBM clones and Apple was luring schools to the Mac platform. The 'plain and cheap' strategy wasn't working, and Bee sales started to drop off.

Hill wanted more money to develop a new generation of 'multimedia' Bees. In 1985, he raised millions by floating the company on the Australian



Stock Exchange. "The money was pretty rapidly blown," remembers Jim Rowe, who joined the company as a marketing manager soon after it went public. Hill spent at least \$1 million developing the high-profile 'Gamma', which never actually went on sale. He then tried to make the Bee PC-compatible, but was forced to drop the idea after two failed prototypes. "It was clear that the new models would not be finished in time to save the company," he said. "Owen kept redesigning the new products, which meant we never finished anything. In a way, we were constantly upgrading before we even got a product made."

In desperation, Rowe and Hill travelled to Taiwan in order to try and strike a deal with a clone-maker. In late 1986, Hill released a dual-branded Microbee/Mitac luggable ("It weighs in at barely 4.9 kilos, and by virtue of a handle, it's also easy to carry!"). "It was too

late," Rowe said. The company went into receivership in early 1989.

It was a tragic end to a platform loved by Australia's first generation of computer users. In the mid-1980s, the Bee was our national pride at PC shows, and APC was

packed with pages of Microbee products. Hill's charisma and vision made him a celebrity at packed Bee club meetings around Australia. A large proportion of Bee software was written by dedicated amateurs and schoolkids. Fans even pioneered the multibillion-dollar computer publishing business. Bob Burt and two friends from a Melbourne Bee club were among the first to publish third-party material based on a computer system. "The shops sold Microbees but they didn't sell books on how to use them or what you could do with them," he said. "We had learned to build them from scratch and had written programs for them. We found we had enough material for a book." Together they wrote 'Wildcards', a 120-page book full of tips on how to use your Bee.

With no publisher, they decided to set up their own business and each contributed \$1,000 to start-up costs. The book sold out in three months, and after numerous reprints and three more volumes, sales hit 50,000. It was then that mainstream publishers took notice. The trio sold the rights to the series to publishing house Pitman for about \$10,000. "Shortly after we sold the rights to Pitman, the PCs started to take over and the value of the stock crashed out," he said. Even fellow author Ash Nallawalla gave up using the Bee. "It couldn't compete with all that PC software," he said.

Fiona Angus





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Quantum computing is an incredibly tricky business, but a new experiment shows that it may be possible with light, a medium that is much more manageable than atoms.

# Schrödinger's computer

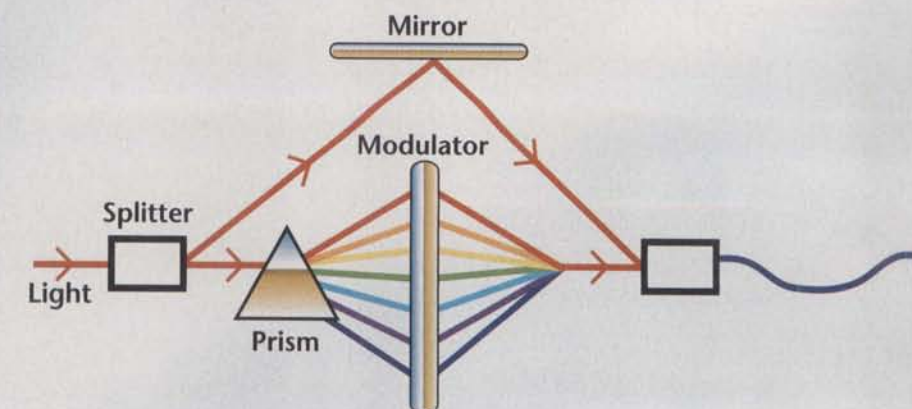
**W**hen quantum computing becomes a reality, it is going to have a bigger effect on the way we live than the development of the transistor. In previous Cutting Edge columns, APC has referred to quantum computing without actually explaining what it is, how it works, or why it is so difficult to understand. So before we look at the new experiment, we will try to explain quantum computing.

The quantum world is one of the most confusing in modern physics, especially because of its highly contradictory nature. Einstein was one of the founders of the field, and even he didn't like it or fully understand it. In the decades since its discovery, many experiments have been performed that prove the weird nature of quantum mechanics.

In the double-slit experiments performed in the early 1800s it was shown that light particles (photons) could behave like both particles and waves. In traditional physics, a particle can be one or the other, but *never* both. Depending on the experiment, it behaved either as a wave or particle, which meant that it could be both at once until measured — a paradoxical duality called superposition.

However, the paradox goes deeper than that, because once you've measured a photon — for size, spin orientation or to see whether it is behaving like a wave or a particle — it then becomes whatever you've measured it as and can never go back to its superpositive state. In other words, the act of measuring determines what the photon is, and it will always be whatever it was measured as from that point on, even though it has exhibited signs of both states earlier.

This is the Schrödinger's Cat theorem, in which Schrödinger posited a cat in a sealed box with decaying radioactive matter, a Geiger counter and a container of poison gas. There is a 50/50 chance that the matter will decay and be detected by the Geiger counter, which will trigger the release of the gas. With quantum physics, the matter is always in a state of having decayed/not having decayed. Therefore, in the sealed room, the cat is both alive and dead at the same time. It is only by opening the box and looking inside, or *measuring* the cat, that



▲ A simplified depiction of the device: the modulator affects one of the light frequencies which is detected when the split beam recombines.

the whole thing collapses to one final state — the cat is alive or dead.

This is where quantum computing takes form. A typical transistor on a chip represents a bit that is either 0 or 1. The millions of transistors on a chip are used as a whole to perform computations. A quantum computer can have the same amount of bits (or qubits), but each and every one of them can represent *both* 0 and 1 simultaneously. With millions or billions of qubits in a quantum computer, infinite configurations can be represented at once. Therefore, complex computations, like cracking strong encryption (almost impossible with today's supercomputers) or searching through huge databases could be achieved instantaneously, the correct answer being pulled out of the infinite possibilities.

As strong as that sounds, there is a major problem with quantum computing. Once you have your answer, you've effectively measured the qubits and they will have collapsed to their final state. Since a particle, once measured, can never return to its superpositive state, by using a quantum computer like this, you have prevented it from being used again.

What is needed is a way to measure the quanta without collapsing them to one state or the other. This calls for either incredibly fine measurements, or snapshots of the qubits so fast that the quantum computer can't detect it. The problem with both is determining when to measure or take a snapshot. Interference may be the answer. This occurs when waves, such as sound waves, collide

to create either larger waves or troughs. Quantum interference can be used to determine what is happening in the quantum world without directly measuring or collapsing the quanta.

A team led by Ian Walmsley, professor of optics at the University of Rochester, has found an alternative to the traditional quantum computer. The team can "build you a computer that is equally efficient, based entirely on light interference. And light is a whole lot easier to manipulate than quantum systems". Light interference can mimic the quantum world perfectly, without the need for new technologies.

The team's device uses an acoustic-optic modulator (a thin film of tellurium dioxide) to store information as acoustic waves are pulsed through it. These sound waves compress some parts of the film and expand others, which creates a pattern of data. A light beam is split and shone onto the modulator, and one part of the beam is split further with a prism. When it passes through the modulator, the compressed and expanded data refracts the light at certain frequencies. On the other side, the frequencies recombine into a single beam, and by joining it back with the second half of the original light beam, you can tell exactly which frequency was altered.

It is the splitting of the light by the prism that gives the quantum parallel. With a sensitive enough device, the beam can be split into almost infinite frequencies, like a quantum computer's infinite qubits.

Darren Ellis



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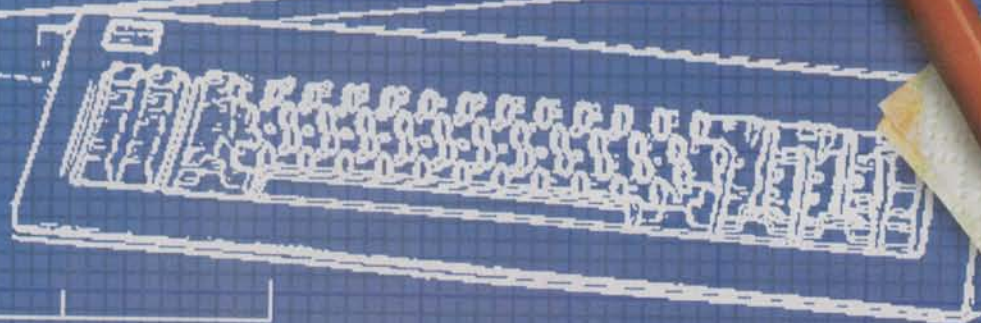
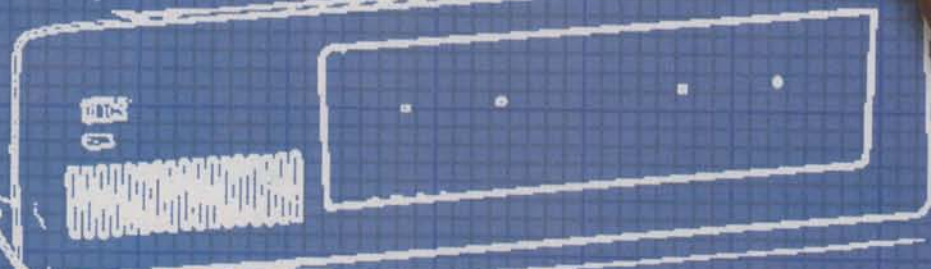
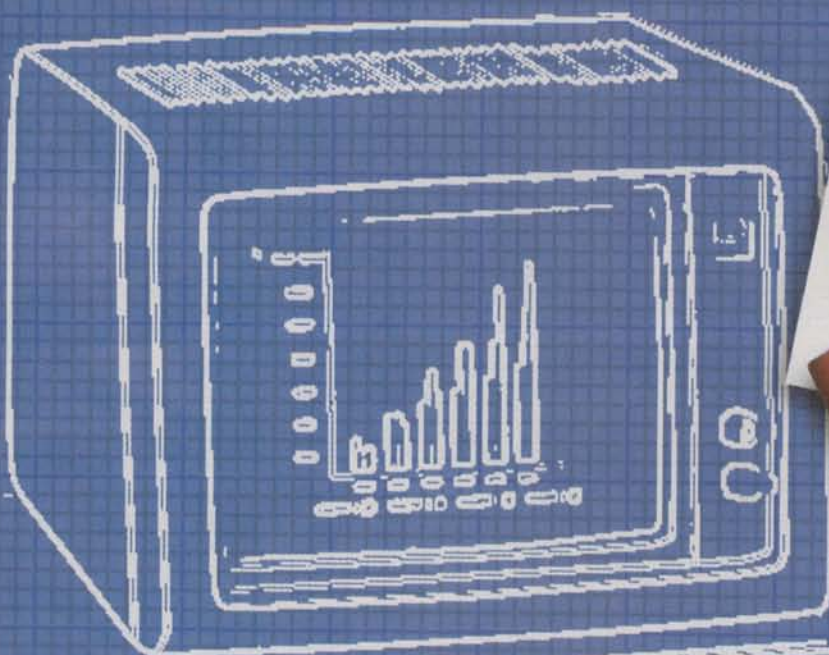
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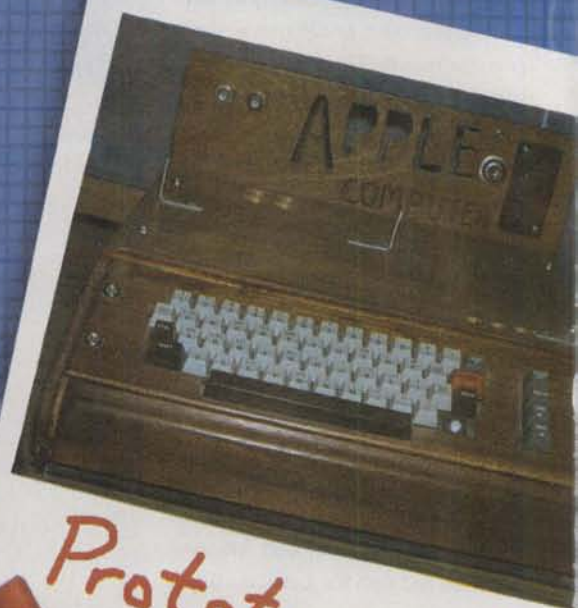
FEATURE 20 YEARS OF COMPUTING

# 20 years of the

THE PERSONAL COMPUTER



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scale



Prototype 1



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# PC

Twenty years ago this month, IBM unleashed the PC and changed our lives forever. **William Maher** and **Fiona Angus** look back at two decades of personal computing.

**J**ust before 8 o'clock on a Monday morning in December, 1980, a rented station wagon pulled up outside an office building in Bellevue, Washington. Nine boxes were unloaded and carted upstairs to a small shipping room in a far corner of the building. There, among bags of polyethylene foam packaging, a computer was unloaded and placed on a spare table.

While a small group gathered to watch, the power was switched on and the screen crackled to life. Then . . . nothing.

However, this was not a technical glitch. The people clustered around the top secret machine were excited by what they saw: they were looking at the first working prototype of the IBM PC. It didn't have an operating system, but that would soon change — the office was that of a young Bill Gates and his small software company, Microsoft.

The rest, as they say, is history. IBM unveiled the PC on August 12, 1981, and within five years had sold 3 million machines — well beyond expectations. Suddenly, the personal computer was no longer just for amateur electronics experts and hobbyists. Anyone could use it, and 20 years later, nearly everyone does.

However, IBM wasn't the first to pioneer the idea of a personal computer, nor has its 'open architecture' design been the only type to gain popularity. Building a computer with an 'open' design meant that anyone could develop hardware and software for the PC, which resulted in an entire industry of clones — imitation machines that use the same basic architecture and Intel processor. IBM was soon forced to watch as other companies exploited the product in which it had invested so much.

## In the beginning

The speed at which engineers pieced together the first IBM PC is also amazing. They were given 12 months to finish the product, and they admit that they worked under extreme deadlines and were bound to an almost paranoid degree of secrecy.

To find out more about the origins of

IBM's first personal computer, APC spoke to Dave Bradley, one of around 12 engineers who worked on the project. His job was to write the basic input/output systems and the assembly language code that controlled the video, keyboard and diskette drive. He was also the person who delivered the first working prototype to Microsoft's office on that morning in December, 1980. Finding himself locked out, Bradley knocked on the door, which was answered by Steve Ballmer, now the president of Microsoft.

Bradley's most fascinating memories are of the work behind the scenes during the project. While some of the engineers had worked on previous IBM computers (including the Datamaster), they now had a 'clean sheet of paper' and relatively few tools to work with. In Bradley's words, "We were almost working with stone knives back then."

The result was that some important parts of the PC design still in use today were created on the spur of the moment. For instance, on a plane trip between Microsoft's Washington office and the research lab in Boca Raton, Florida, Bradley and others sketched out the ASCII character set for the first IBM PC (those weird-looking letters, numbers and symbols on your keyboard). What better way to make use of a five-hour plane flight?

In other cases, Bradley's working conditions were downright bizarre. IBM realised that if its new PC was to be used in the home, it would have to comply with Federal rules for electromagnetic emissions. Without proper testing facilities, the IBM team had to resort to 'open field' testing, yet the only suitable open space in Florida was the Everglades.

Bradley explains: "We had guys — and this was back in the days of white shirts, ties, suits to work everyday, even the engineers — putting on T-shirts and shorts and going out into the swamp in order to do the testing of this machine. It was kind of different to see them dragging themselves in at



▲ Dave Bradley: One of the original 12 engineers who worked on the IBM PC.





## Landmark PCs

The first popular 'personal' computer, the **MTS Altair 8800**, was only for the amateur electronics expert. It appeared on the cover of *Popular Electronics* magazine in January, 1975 and was sold by mail order as a series



Picture courtesy of the National Museum of American History, Smithsonian

of components for \$US395, or pre-assembled for \$US495 (not a bad deal, considering many people reportedly couldn't make the thing work). The centrepiece was Intel's 2MHz 8080 processor and a S-100 system bus with 256 bytes of RAM. It did not have any storage, display or input devices. To enter data, you had to fiddle with the red flashing switches on the front panel. It was designed and manufactured by a small Albuquerque calculator kit maker called Micro Instrumentation and Telemetry Systems (MITS). In February, 1975, Bill Gates and Paul Allen licensed their BASIC programming language to MITS, making the Altair the first personal computer to run Microsoft software.



Picture courtesy of [www.apple2.org](http://www.apple2.org)

In 1976, the first Apple computer went on sale. The **Apple I** had no case and came as a disassembled circuit board with a MOSTek 6502 1MHz processor. Only a handful were ever sold, but it formed the basis of the popular Apple II series — the first

the end of the day, sun-burned and covered with insect repellent and with a whole set of results on how well the machine was performing."

Back in the labs, the team was fighting the general belief that things couldn't be done quickly at IBM. There was no time to develop and test all components. So they shopped for completely functioning and pretested parts, combining it with code from IBM programmers.

Devising this code was a crucial task, and with only 40K of read-only memory and 16K of RAM, there wasn't much room to work with. For a month, Bradley and others would meet every morning to hash out ideas, then in the afternoons they would put those ideas into action.

One of Bradley's own contributions is now used by virtually every PC user, but was originally only meant to assist IBM's backroom engineers. Looking for a way to speed up the reboot process when the test machine crashed, Bradley came up with the idea of a 'warm reboot'.

"We didn't want to have a reset switch that somebody could hit by accident. I had a little bit of room left on the BIOS, so I arranged it so that if you hit three keys at the same time, it will bypass the memory test and run much faster."



Picture courtesy of IBM.

▲ In the late '70s, IBM attempted to popularise the 'personal computer' with the System/23 DataMaster. Although the machine failed, it later proved to be a training ground for the engineers of the IBM PC.

Bradley picked out the 'Ctrl' and 'Alt' keys. "Then I picked this other key that is all the way over the other side of the keyboard, so you don't hit it by mistake — the delete key. Now, if you hit Ctrl-Alt-Delete, the system resets. It wasn't quite an original thought, but it certainly wasn't intended to become the cultural icon that it has."

A year of designing time might seem like an eternity to PC vendors today, but it was blazingly fast by IBM standards at the time. In Bradley's own words, the group of 12 engineers were a 'renegade band' that got to do what they wanted in a fraction of the time it would take other divisions in the company.

"When we look back, we can always say 'we should have done this differently'. We made a lot of decisions fairly quickly that had a number of ramifications we

## Ahead of his time, but behind the money

Long before IBM had even thought about a personal computer, an engineer named Doug Engelbart was using many of the everyday PC functions we take for granted. As a researcher at the Sanford Research Institute in the 1960s, Engelbart headed a team that defined the future shape of the personal computer. At a packed technology forum in 1968, he demonstrated the first mouse, as well as hypertext linking, real-time text editing, integrated text and graphics, and online conferencing. Engelbart dreamed of using technology to extend an individual's intellect and improve the human condition. He became a technology researcher after



▲ The first mouse



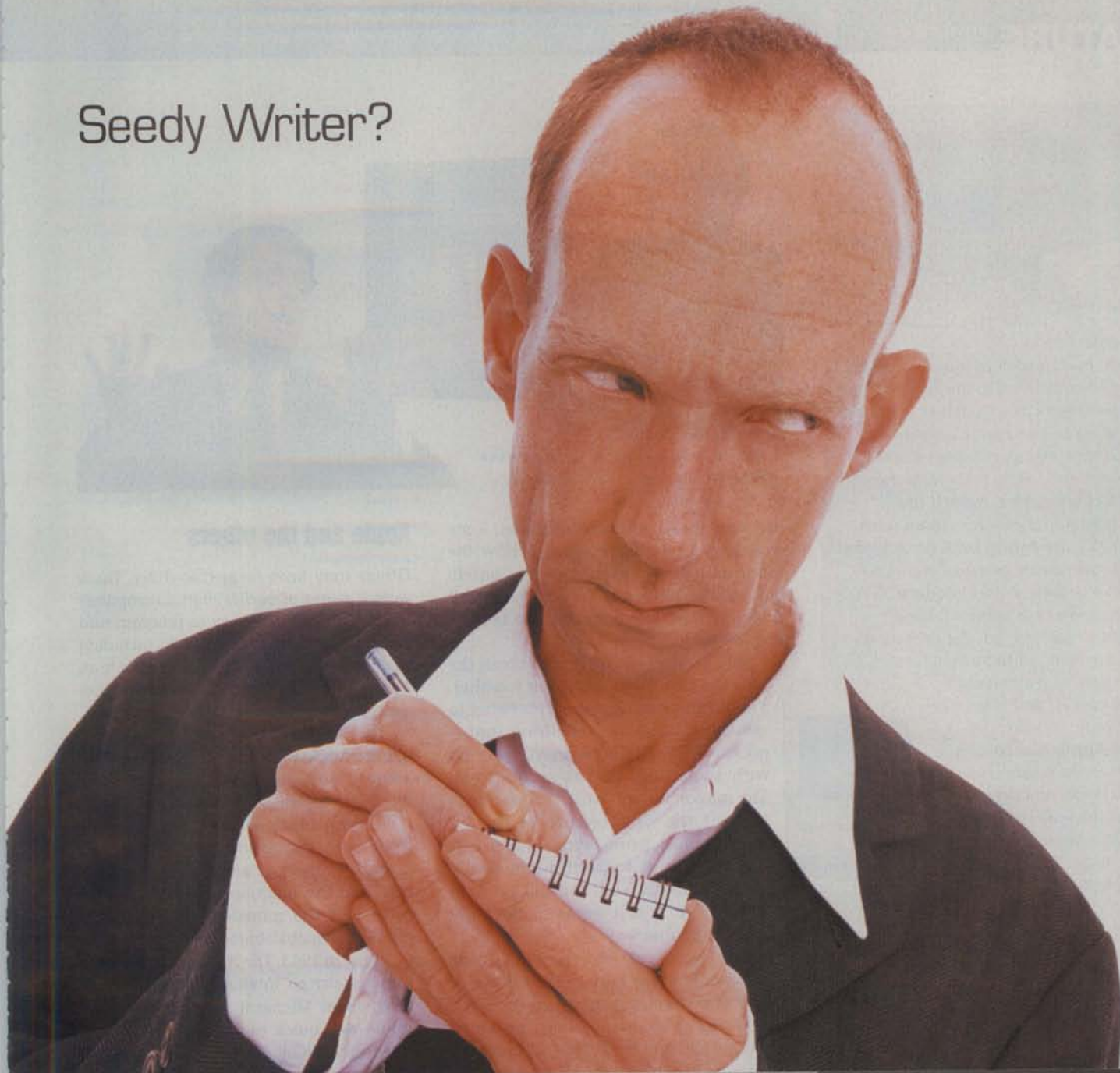
▲ Doug Engelbart

serving as a radar technician in WWII, and never cashed in on the tech boom like other PC pioneers. He continues to conduct research today, believing the value and benefits of technology are more important than money.

(Pictures courtesy of Doug and Christina Engelbart, The Bootstrap Institute)



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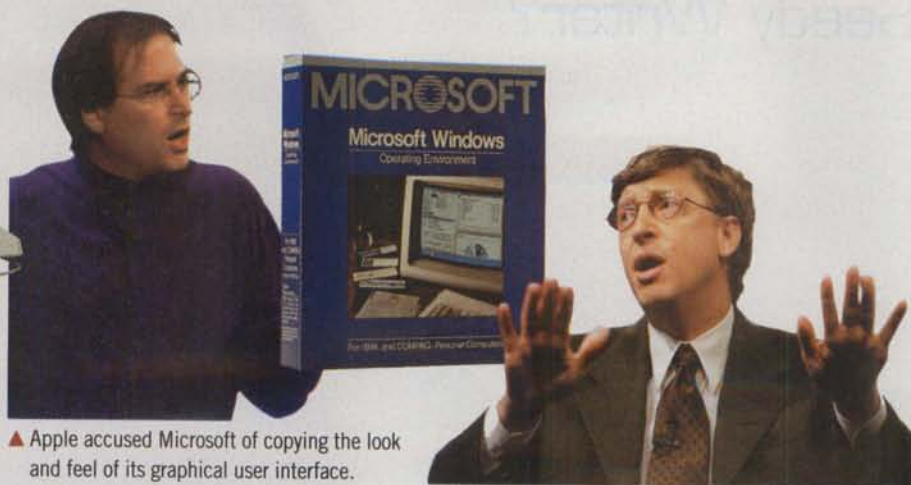




popular factory-built, mass market personal computer and the main rival to the IBM PC. The Apple II had colour graphics, and best of all, came in a plastic beige box. Word processing and spreadsheet applications, along with 4K of memory and a floppy drive, made it the computer of choice for serious users. In 1983, the **Apple LISA** became the first mainstream personal computer with a Graphical User Interface (GUI). The gawky case made it a huge commercial flop, but the operating system went on to form the basis of generations of future PC and Mac software. In 1984, the first **Apple Macintosh** succeeded where LISA had failed, making the Mac the only lasting rival to PC-compatible products. The Apple Macintosh had 128K of RAM and was also the first popular personal computer with a built-in drive for 400K 3.5in disks.



The **Commodore 64** was more like a games console than a PC, but it brought personal computing to the masses in 1982. The keyboard unit plugged straight into a conventional television, and the colour graphics and range of inexpensive peripherals made it ideal for lounge room gaming. The 64K memory and audio chip had no real competitor in the \$500 price range and consumer sales quickly skyrocketed to 22 million, making it one of the best-selling computers of all time. However, despite its popularity, it was never really seen as anything



▲ Apple accused Microsoft of copying the look and feel of its graphical user interface.

just didn't have time to think about. Some were very esoteric things, like how the interrupt lines were wired on the system bus. Had we chosen to do it differently, it probably would have worked out better," Bradley said.

Still, Bradley has no regrets about the way the first IBM PC was put together. "In old engineering terms, it's better to get there fast with something that is good enough than to arrive later on with something that is magnificent. The market doesn't wait. If you were to look at the architecture of the PC today, apart from being bigger/better/faster, it looks fundamentally similar to what we did back in 1981. It still works in basically the same way."

The week the new PC was announced in New York in 1981, Bradley recalls the development team gathered outside their Florida lab, someone pulled out a guitar, and they sang 'O Lord, it's hard to be humble when you're perfect in every way'.

## Apple and the others

Others may have begged to differ. There were a string of earlier digital computers that were relatively easy to program and small enough to fit on a desk, including the box-like Altair and other models from Tandy, Atari, Commodore, Osborne, Sinclair, Hewlett-Packard, Coleco and DOT. By the late 1970s, factory-built systems like the Apple were available, so computer owners no longer had to piece their machines together using soldering irons.

Among other technology pioneers, Apple was responsible for some crucial breakthroughs that eventually made their way into the ubiquitous PC. The first of these was the mouse-driven graphical interface, which debuted with Apple's LISA machine in 1983. The IBM crowd didn't get a mouse-driven interface until two years later, when Microsoft released Windows. Apple was quick to accuse Bill Gates of copying the 'look and feel' of its interface.

Gates responded by pointing out that both Microsoft and Apple owed a debt to



▲ Early Microsoft advertisements



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other than an electronic toy. Commodore later tried to further 'converge' computing with home entertainment with the Commodore Amiga series.

The **Amiga 1000** was the first true 'multimedia' computer, and in 1985, the technical design was considered way ahead of its time. The Amiga had dedicated chips with names like Agnus and Denise to handle graphics and sound, as well as four-channel stereo sound (very cool). It was also astonishingly cheap — usually less than \$1,000. Even with only 512K of memory in the first Amiga 500, the system could handle graphics and animation not seen before in IBM machines. The Amiga also offered fully pre-emptive, windowed multitasking, well before anything similar was available on Intel systems.

However, the Amiga was only ever regarded as a games machine. The proprietary technology couldn't compete against the growing market for PCs, and the company finally collapsed in 1994 after a series of management problems. The operating system, AmigaOS, still survives and there has been talk of licensing designs for a new Amiga machine to third-party manufacturers.

The obscure **Samtron 286S** was just one of thousands of PCs sold in Australia based on the open design of the IBM PC. These 'clones' may have been lower quality copies of the IBM PC, but they could do the same things, and they were much cheaper. In 1987, clone-makers accused IBM of attempting to reintroduce proprietary architecture in a last-ditch attempt to save its declining market share. IBM had based its new PS/2 series on the recently developed Micro Channel Architecture (MCA), discarding the



Xerox researchers. Apple's Steve Jobs had visited Xerox's labs in 1979 and saw the Xerox Alto, one of the first machines with a graphical interface similar to those used today. The mouse had also been invented much earlier by English inventor Doug Engelbart.

Even Microsoft arguably had some help devising the operating system for IBM's first PC. As the story goes, Gates decided he wouldn't write the software from scratch, but would look around for someone who had already done most of the work. He initially turned to QDOS (Quick and Dirty Operating System), which was written by Seattle Computer Products for another prototype Intel machine. When IBM didn't buy QDOS, Microsoft quickly purchased the licence. QDOS was then reworked for IBM's new machine and called MS-DOS. It might have been Microsoft's new product, but critics pointed out that Gates couldn't take credit for all the work.

IBM can also thank clone vendors for the success of its PC design; these were companies that copied IBM's original PC design for their own machines. In Bradley's words, the appearance of clones was a 'good news and bad news' story for IBM.

On one hand, the IBM development team was disappointed to see others "riding on our coattails". However, IBM did not have the resources to do all the technical

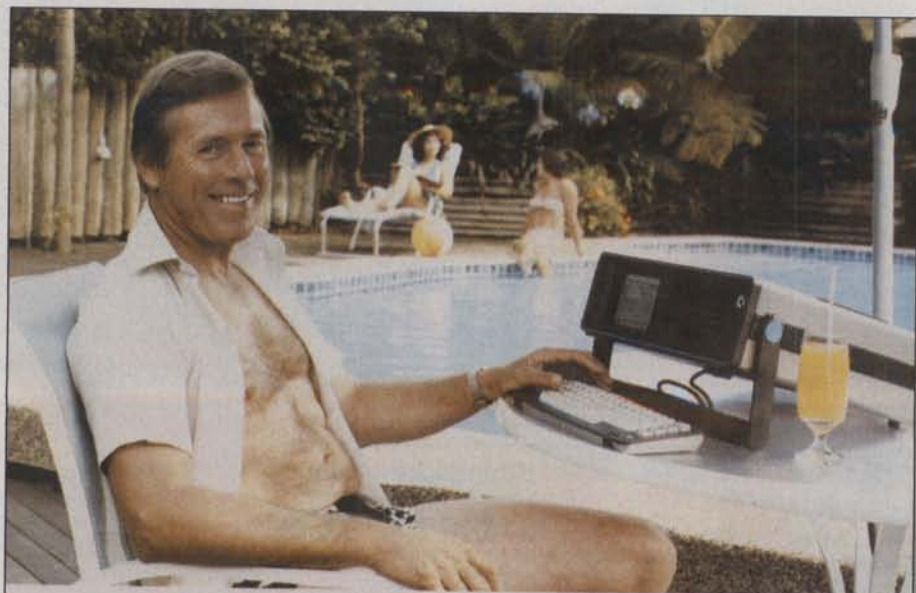


▲ IBM's famous Charlie Chaplin advertisement for the first PC.



▲ A clone PC manufacturer pokes fun at IBM.

work to continue developing a universal PC standard, so there was no choice but to allow others to replicate the design. IBM released the technical reference manuals that contained the entire schematic for the IBM PC, as well as the assembly language listings for all the code Bradley had written.



Who's keeping up with Commodore?





▲ Microsoft advertisement from 1986: Note the half-hidden reference to Macintosh behind the sand.

"We didn't have the time or the luxury of being able to produce really detailed architectural specifications of what the interface was and how it should interact with the machine. We figured the next best thing would be just to publish what we did and anybody could then very easily figure out what the interface is. It would also serve as a model or a teaching guide for someone to develop stuff that would plug into the machine," he explained.

Others suggest that IBM didn't want to make an 'open' design at all. During the frantic development phase, Bradley and his colleagues used so many off-the-shelf parts, it was easy for electronics makers to duplicate the end product without infringing any copyright laws. The BIOS of the IBM PC was simple and easy for any electronics engineer to work with, unlike the complex programming underlying

the Mac, which has long been an effective barrier to prospective clone makers.

In the end, IBM couldn't stop the PC becoming the industry standard. All Bradley and his colleagues could do was to enjoy the honour of 'inventing' the PC long after clone makers had forged ahead.

While proprietary systems such as the Atari and Sinclair died during the 1980s, IBM clones only became more popular. People were inspired to buy their first computers after seeing useful applications such as the Visicalc spreadsheet. Laser printers and desktop publishing software also helped Mac and PC sales reach new heights in the late 1980s.

In the first 10 years after 1981, the processing power of personal computers increased tenfold. System memory grew a thousand times (from 16K to 16M), the instruction execution rate (MIPS) jumped a hundred-fold, and storage increased by a factor of 10,000 from 160K to 1.6G.

People also found new uses for PCs. Sound and animation, and later video became key selling points. Games, too, became huge sellers and encouraged an entire generation to learn about PCs. Bulletin boards introduced people to the concept of "going online". The more ambitious even tried to find new ways to interact with computers via speech. Eventually, it was also possible to shrink the size of the PC to something you could fit in a briefcase and balance on your lap.

## The BeBox and the GeekPort

The BeBox is another curiosity in the history of the PC. Unveiled in 1995, the machine featured two PowerPC RISC processors, pre-emptive multitasking and lots of space for expansion. At \$US1,600, it was also much cheaper than other multiprocessor machines at that time.

With four midi ports, 16-bit, CD-quality sound, and then super-fast PCI bus technology and a digital media toolkit, the BeBox was every multimedia fanatics' dream. It even had a mysterious 'GeekPort', which could be used to plug in analog or digital devices.



However, by 1997, multiprocessor machines were far more common, and Be decided that it would be sensible to focus instead on sales of its operating system, called BeOS. The BeBox is now a collector's item, while the BeOS has found its way onto other PowerPC platforms and also Intel machines.

Be's next big hope is the Internet appliance. It has developed the BeIA operating system for a Sony machine called the e villa. The e villa has no hard drive and is designed for playing and downloading audio and video from the Internet. It will sell in the US for \$US500.

original IBM PC's Industry Standard Architecture (ISA) and promising PC users a new era of multitasking. In retaliation, a group of angry clone vendors (including Compaq) came up with Extended Industry Standard Architecture (EISA), a standard similar to IBM's original ISA design, but with room for extra connections. Over the next five years, the clones won the popularity war and IBM lost its lead in PC sales. By the early 1990s, MCA and EISA had been superseded by IBM's Peripheral Component Interconnect.



In 1998, the iMac series changed the face of personal computing, if not the technology. After a decade dominated by Windows-based PC clones, Apple discarded its staid image with a colourful, all-in-one consumer PC range. The original iMac was not a powerful machine, with only 32M of memory, a 233MHz processor and a 4G hard drive. It was designed as an inexpensive portal to the Internet and had no floppy drive or USB plug-ins. Apple went on to popularise the idea of the 'digital lifestyle'.

The **Dell Dimension 8100** was among the first PCs with an Intel Pentium 4 processor. Released in late 2000, the P4 was meant to introduce a new PC for a new millennium, although initial sales failed to live up to expectations. The chip was capable of the highest range of clock speeds seen by PC users, starting from 1.3GHz and







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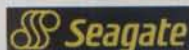
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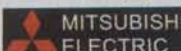
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## Feature Product

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Additionally it includes onboard Promise ATA100 IDE RAID 0/1.



## Feature Product

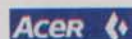
ASUS A7V133 Motherboard

The A7V133 is based on the VIA KT133A chipset and supports the latest AMD Thunderbird and Duron socket A CPUs with bus speeds up to 266MHz.

Includes onboard Promise ATA100 IDE RAID 0/1 controller.



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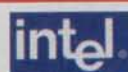
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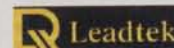
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## Feature Product



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extending up to 1.7GHz (soon to be 2GHz). However, the first P4 systems, such as the 8100, were expensive, and did not significantly outperform Pentium III desktops in everyday computing applications. Intel insists that the benefits of the P4 will start to emerge as more hardware and software is configured to take advantage of the new technology. Meanwhile, alternative brands such as AMD are making inroads into Intel territory, although Intel is far from losing its lead as the chip-of-choice for PC users.

PC makers are also experimenting with cut-down PC designs like **Sony's eVilla**. Unveiled overseas, the eVilla has a 15in monitor in a vertical position like early Macintosh computers. Inside, there is no hard drive, although there are USB ports



for connecting external devices. The eVilla is designed for Web browsing and has inbuilt speakers and a browser-style menu. The machine sells overseas for \$US500, plus extra to connect to the Web.

**Compaq** predicts that in the future, the PC will not only become smaller and more powerful, but portable as well. This 'hybrid' PC will double as a notebook and fold-out desktop PC, and include a flat panel screen and wireless keyboard and mouse.

Will the PC disappear? As the Internet becomes our primary source of information, could we discard the PC for devices like **Nokia's** concept 3G handheld? Running off a high-bandwidth, third-generation mobile network, this handheld will be able to organise much of the information for which we use our PCs today.



So where are we today? IBM tried to promote its products as high-quality PC systems, but with cheaper and virtually identical machines available, the company had created the conditions for its own demise. By the late 1980s and early 1990s, IBM was no longer the world's leading PC seller. At the start of 2001, IBM held less than 10% of the world desktop PC market — behind Compaq, Dell and Hewlett-Packard.

Now the PC market is becoming stagnant. Research firm IDC predicts that 500 million PCs will be in use this year, but it could end up being one of the worst years in the history of PC sales. After 20 years, has the PC reached its use-by date?

## After the PC

In the 1990s, the concept of a cut-price 'network PC' was championed by the head of Oracle, Larry Ellison. The machine, which would cost less than \$US500, would download applications, instead of storing them on a hard drive. Ellison even suggested that network PCs would outsell ordinary PCs by the year 2000. However, falling hardware prices meant the concept became the favourite target of Oracle critics.

Despite the setback, the concept of a paired-down computer has persisted.

For instance, Sony recently launched a \$US500 computer designed only for Web browsing. The 'eVilla' has no hard drive and no other disk drives, although it has a slot for Sony memory cards and USB ports for connecting external drives. Rather than

Windows, the machine runs the BeIA operating system from Be.

Even Ellison's network PC has survived, and is being marketed with Oracle backing in the US by the New Internet Computer Company. For \$US200 you get a Web browsing machine similar to the eVilla, but with a Cyrix chip, 64M RAM, 24-speed CD-ROM drive and choice of LCD or SVGA monitor.

The beauty of these machines, argues Sony and NIC, is that they *don't* work like an ordinary PC. Here's a sample of NIC's marketing hype: "Everyone agrees com-

puters cost too much. They're a hassle to maintain. They're expensive to replace. They get viruses, hard disk crashes and all kinds of software configuration problems."

Now, portable devices are becoming powerful and affordable enough to present a serious alternative to the 'traditional' desktop PC. Microsoft, Sony, Intel



▲ Love it or hate it, the Web tablet just won't go away. Shaped like an oversized notepad, the tablet has an LCD touch-screen and a radio module for wireless Internet access. Enthusiasm for "pen computing" goes back at least a decade, and the concept has seen some spectacular failures. Now tablets are here again, with Microsoft and other big names putting their names on the devices. Pictured above is SONICblue's ProGear tablet, which runs Linux and features an Intel-compatible Transmeta processor.

and others are working on 'Web tablets' — notepad-style computers with wireless Internet access and touchscreens. Linux is also being used for a multitude of devices, including special boxes that offer Internet and games on television sets. Even IBM is looking towards handheld computers, although the company calls it 'pervasive computing'.

Are such Internet devices the way of the future for PC design? Analysts have been predicting for several years now that we will see small devices with an embedded chip designed to carry out one function. Linux is said to be perfect for the task. Bradley now works on IBM's xSeries Internet servers.

Competition is also increasing in the processor space, although Intel remains far ahead of the pack. Transmeta's low-power chips are making waves in the notebook and portable PC market, while AMD continues to annoy Intel with Pentium-level processors.

However, for all the marketing hype, there is an element of déjà vu. The computer industry has been saying for at





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## Xerox selling PCs?

Many people often despair that that Xerox has failed to take full commercial advantage of many inventions made in its PC labs in the 1970s.

For example: Xerox's personal computer, the Star, included the world's first what-you-see-is-what-you-get (WYSIWYG) editor, first commercial use of a mouse, graphical user interface (GUI) and bitmapped display. Both Apple and Microsoft owe a great debt to Xerox for these innovations.

Consider what may have happened had Xerox decided to capitalise on its research and market its own cheap PCs. Perhaps Xerox could have become a big name in PCs, like IBM or Compaq?

## IBM's big mistake?

Things might have turned out differently for IBM had it retained the rights to the software for its first PC. As it was, a forward-thinking Bill Gates realised there was the potential to make big money selling packaged software.

IBM eventually pushed ahead with the OS/2 operating system during the mid-'80s. However, by that time, most PC owners were already won over by DOS and Windows.

What of the others? MS-DOS was not the only popular operating system available at the time IBM's PC was announced. Rumour has it that another OS called CP/M had sold 600,000 copies at the time.

The importance of CP/M shouldn't be underestimated. IBM considered using CP/M as the main operating system for its new PC, although that role was eventually given to MS-DOS. CP/M was also used to create QDOS, which was later turned into MS-DOS by Gates.

Perhaps the landscape of the PC industry might have been different, had these alternative operating systems not faded into obscurity.

## Atari makes it big

Another legend is that IBM nearly bought Atari's early line of computers. Along with Tandy and several others, Atari was already on the home computer scene before IBM. Had things turned out differently, maybe the Atari wouldn't be remembered only as a games machine by retro-enthusiasts.

least the last 10 years, that tablet PCs are the 'next big thing', but the concept has never taken off. Perhaps high-bandwidth wireless networking will mean that Web tablets can finally be useful.

'Pervasive computing' is also part of the agenda being pushed by companies such as Microsoft, which believes software can be sold as a service for a yearly rental fee. This idea caused huge excitement in the business world two years ago, but widespread change is yet to come. Under Microsoft's plan, we might eventually return to the concept of Larry Ellison's much-derided network PC.

For now, the PC Bradley helped to design two decades ago lives on. "I think there is going to be a place for personal computers in the foreseeable future.

I think it is likely that, in addition to personal computers, we are going to see a lot of other things, such as PDAs. It doesn't replace the PC, but it extends its capability," he said.

Intel and other key technology providers remain confident that they can advance PC technology for

at least the next 10 years. The initial challenge will be to keep up with Moore's Law — the notion that silicon chip computing power will double every 18 months. Intel is confident that it can keep upgrading chip power until at least 2010.

What does this mean for the home PC? By Intel's estimates, the number of transistors on a chip will increase from 25 million in the Pentium 4 to possibly 2 billion, some time around 2010. Intel says this could mean PCs with a clock speed of 30GHz — enough to make the latest 1.7GHz Pentium 4 look weak (see 'Where to now for the PC?', page 84).

By then, some radical changes to PC design might be in order. Cooling, already a problem, will be an even greater priority, as chips will be running in the order of 600W. Perhaps liquid cooling systems might not seem so harebrained in 10 years' time.

It will also be interesting to see which parts of IBM's original design survive. Will there still be a need for Ctrl-Alt-Del in a decade's time? Let's hope so, if only for old times' sake.



▲ The shape of things to come? This concept PC from Ericsson folds up to fit inside a pocket.

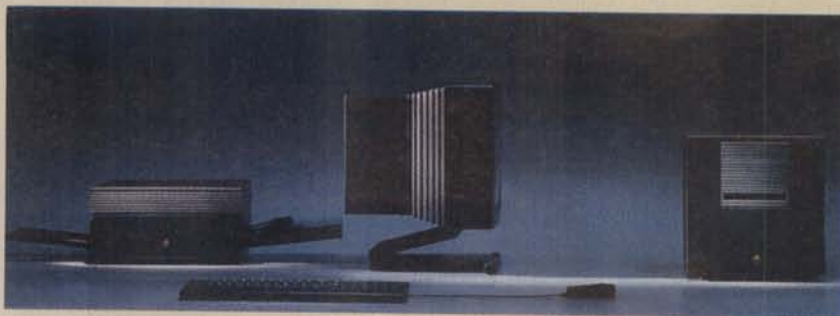
## The NeXT computer: gone but not forgotten

There have been other manufacturers who have made waves with alternative systems and design concepts. When Steve Jobs left Apple in 1985, he went to work on his own machine, the NeXT Computer System. NeXT was a Unix machine built around a Motorola processor and featured a 256M erasable magnetic/optical drive — one of the first of its kind.

The NeXT system also produced less heat and used less power than competing designs, something that is becoming a major factor in PC design today. The NeXT motherboard was made entirely by an automatic assembly

line, which meant faster and cheaper production. The system also included digital signal processors, a device on which Intel and others are now focusing their energies for mobile computers.

The NeXT system was a Unix machine, and a rather expensive one at that, so it was never really meant for the PC market. The company was eventually bought by Apple, where Steve Jobs would later unveil the concept of funky PC design with the iMac. The operating system, NeXTStep, found its way on to other operating systems, and NeXT was eventually bought by Apple.





## What if . . . ?

Arguably, Apple has done more to shape the PC than any other technology company, yet the Mac platform has only ever attracted a small proportion of personal computer users. What if Apple had followed in the footsteps of IBM, and relinquished control of its system architecture to clone makers? Would the world be dominated by cheap Mac clones?

Before PC clones flooded the market, Apple successfully defended its platform against clone makers. The Mac platform was complicated enough to earn



▲ The Dynamac joined other forgettable Mac clones such as the SuperMac and the MaxxBoss.

copyright against those who sought to cash in on Apple's research.

Despite this, Apple came precariously close to losing control of the Mac platform to clone makers in the '90s. At the time, PC clone makers were becoming so successful, Apple thought it could increase its market by licensing the Mac platform to third parties. However, Apple had no intention of becoming another IBM. It forced prospective clone makers (which included Australian company Applied Engineering) to sign water-tight licensing agreements. The short-lived Mac clone industry produced such forgettable machines as the M\*Power and the PowerTower. Mac fans spurned the pretenders.

Meanwhile, Apple realised that the clone makers had the advantage as they were not burdened with the cost of developing the Mac operating system, and could undercut genuine Macs. Steve Jobs put an end to clones in the late '90s, paving the way for the iMac. Today, the Mac remains the lone ranger in a world of hostile PC clones.



▲ The hybrid iVic

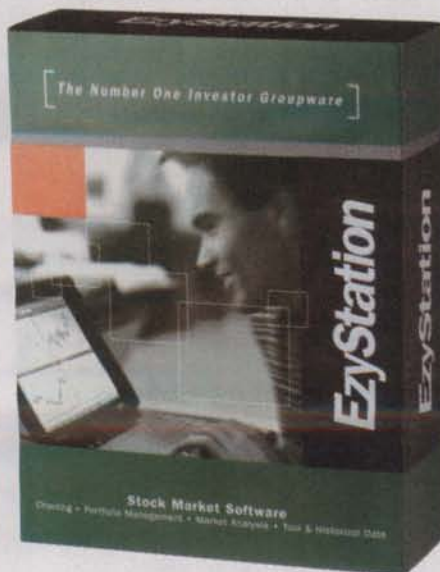
What if the Commodore and the Mac platform had merged in late '70s? Would personal computing now be based on Commodore's multimedia and digital convergence capabilities, mixed with the stable graphical user interface of the Mac?

Popular computing mythology holds that Steve Jobs and Steve Wozniak almost sold the Apple I to Commodore. However, Jobs changed his mind at the last moment and Commodore was reduced to buying the second-choice MOS technology.

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## Flashback

IBM may have adhered to the 'beige box' PC design philosophy, but the others... well, take a look for yourself. PC design in the early '80s was a mixed bag, largely because each machine was so different. Some had tape drives,

others used floppy disks. Some were mere keyboard units like the ZX Spectrum, while others combined PC and screen in one box. Some early 'portable' computers were so large that they only just fitted inside a briefcase.



▲ Executive 816 Portable Briefcase Computer



▲ Spectravideo SV-318



▲ Sinclair ZX Spectrum



▲ The Commodore Portable Computer



▲ HP Integral Personal Computer



▲ Commodore Plus/4



▲ Sony HB-75 MSX



▲ NEC APC

## Vintage computing

An APC writer once likened vintage computers to a 1954 Morris Minor: fun to drive every once in a while, even if the ride can sometimes be a little bumpy.

You'd be amazed at the effort some people take to resurrect obsolete computers. Some brands are even going through a full-blown revival. Amiga, for instance, has a loyal band of followers who just won't let the system die. There has even been talk of licensing designs for new Amiga computers.

So what's the attraction? Old PCs can be fun to use. Think about it: no incentive to upgrade, no fussing with complicated software, no need to worry about backing up your 20G hard disk.

However, usually it's the challenge. Take the most obsolete computer you can find and see if you can make it surf the Web, or connect to your Linux server. Here are some places to start.



- News, discussion and links at [www.amiga.org](http://www.amiga.org).
- Get the latest on the 'new' Amiga at [www.amiga.com](http://www.amiga.com).

## Commodore 64

Like the Atari and early Apple machines, the C64 uses the Motorola 6502 chip — a popular starting point for do-it-yourself computer projects. You can use your old C64 to surf the Web, connect to a PC or an Amiga, read those old 5.14in DOS disks, create some digital music, even try an experimental operating system. The really adventurous even build entirely new computers based on old Commodore parts.

- The 6502 community is at [www.6502.org](http://www.6502.org).
- Get software and schematic diagrams at [www.funet.fi/pub/cbm](http://www.funet.fi/pub/cbm).
- Find repair tips at [www.zimmers.net/commie](http://www.zimmers.net/commie).

## Apple II

There is all sorts of information on the Web for Apple II fanatics. You'll find old manuals, hardware, new software (and old) and things you can do with your Apple II. If you have a 16-bit model, you can even do some Web surfing.

- Learn more at [www.a2central.com](http://www.a2central.com).
- Get Apple II manuals online at [www.educate.net.au/~apple2/manuals/index.html](http://www.educate.net.au/~apple2/manuals/index.html).
- Surf the Web with your Apple II at [sis.gwlink.net](http://sis.gwlink.net).

## Atari

For the genuine retro gaming experience, there's no going past an Atari. The original Atari games were in cartridge format, but you can download them and play them on your PC using an Atari emulator. Atari also released 8-bit PC-style machines, and you'll find plenty of software for these on the Web.

- The latest Atari news and links are at [www.atari.org](http://www.atari.org).
- All those old cartridges are at [www.ataricentral.com](http://www.ataricentral.com).

## Commodore Amiga

The Amiga is hugely popular with retro enthusiasts, due in part to its multimedia capabilities and Motorola chip. Amigas also connect to interlaced monitors or televisions, so there's no need for an expensive screen. Enthusiasts even swear that they can browse the Web comfortably with a measly 7MHz processor. New versions of AmigaOS are still being created, and there's even the possibility that new machines will be made under the Amiga brand.

## Go retro without the hardware

Don't have an old computer, but want to try to experience the old stuff for yourself? Then you'll need emulation software, which allows your PC or Mac to pretend to be an old Apple II, Amiga 500, or even a clunker like the Commodore Vic-20 or Tandy's TRS-80.

Once you have an emulator, there are plenty of games and software to download. If you own a PC, go to [www.emuunlim.com](http://www.emuunlim.com); if you own a Mac, visit [www.emulation.net](http://www.emulation.net).





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# Then



**IBM PC**, released August 1981

# Now



## Price

In 1981, an IBM PC system sold for about **\$4,000**. Today, an equivalent consumer PC with 850MHz chip, 64M RAM and a 20G hard drive costs about **\$2,000**. This high-end IBM NetVista X40i starts from about **\$5,500**.

**IBM NetVista X40i all-in-one PC**, to be released October 2001



# Where to now for the PC?

Although handheld computers and other designs are rapidly gaining popularity, the future remains bright for the ubiquitous desktop PC. Most importantly, chip speed will continue to increase over the next 10 years. Many of the tools and technologies needed to make this leap are already being tested.

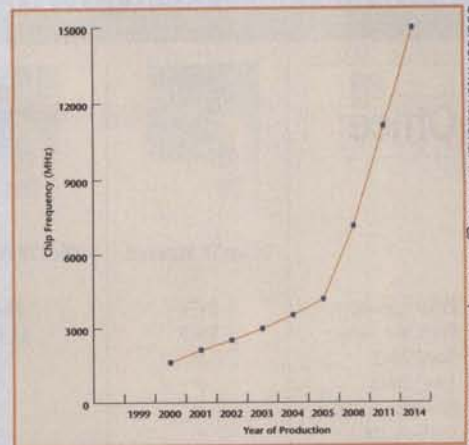
This is despite fears that we had reached the limits of silicon technology. Intel now claims that it will be able to keep doubling processing power until at least 2010. Beyond that, we can only guess at the direction PC technology might take. Some analysts suggest that the size limits of silicon technology will be reached by 2014.

The problem lies in reducing the size of transistors to fit onto a silicon chip. Some processors are now being manufactured using transistors which are 130 nanometers (nm) in size, and this is likely to fall to 100nm by 2005. By 2014, the industry predicts that 35nm manufactur-

ing will be possible, but beyond this, improvements may be impossible using current technology.

Meanwhile, chip sizes will continue to shrink (although heat sinks and other paraphernalia are getting bigger) and processing speeds will increase. Changes will also be made to other parts of the PC — most importantly, the storage space and screen (see below). PC makers are also finding new selling points for their products, including size, power consumption and even noise. Seagate recently unveiled the world's first "virtually silent" 80G hard drive.

The next few years will also determine which new technologies become essential parts of the PC, and which fall by the wayside. Will we use USB 2.0 or Firewire? Will DVD become the disc of choice for storing data? Will Transmeta and AMD processors survive, or fade into obscurity? What other new technologies will appear?



Source: International Technology Roadmap for Semiconductors 2000 Update

Some people are questioning the need for all these changes. Do we really need to keep upgrading our computers when we already have what we require for word processing, or to use email or surf the Internet?

The answer will emerge over the next few years, as we discover new roles for the PC. Will the desktop PC take a back seat to handheld computers, or will it become the centre of our "digital lifestyle"? Below are some of the major changes in store.

## Cooling

Some radical changes to PC design will be needed by 2010. Cooling, which is already a problem, will be an even greater priority, as chips will be running in the order of 600W. Perhaps liquid cooling systems might not seem so harebrained in 10 years' time. IBM is already experimenting with fan ducts to channel air directly on to memory and processor chips. In the future, we might also see heat sinks for other components, such as RAM.

## Processor

Just how powerful will PC processors be in 10 years' time? Intel claims that if technology trends continue, computer chips as fast as 30GHz could be possible by 2010. Of course, this will require major developments in miniaturisation; the number of transistors on Intel chips has already increased from less than 100,000 in 1978 to 42 million in today's fastest Pentium 4 processors. Intel says that a chip with 2 billion transistors could be possible by 2010.

## Display

PC display technology is well and truly due for an overhaul; by 2010, new technology will mean that screens should be a lot easier to read. One of the more recent breakthroughs has been to replace the process used to align display molecules in flat-panel liquid crystal displays. The process will make it much cheaper to make LCD screens, and they will have fewer flaws. In the long run, LCD screens might eventually be replaced by organic light-emitting diode (OLED) displays, which rely on glowing organic matter rather than backlighting. The screens are much brighter and can be viewed more easily from an angle. For the desktop, IBM has created a 22.2in screen, which it claims will be capable of displaying 12 times more detail than current monitors, although this technology won't be available for the home market yet. Meanwhile, Xerox and others have been working on electronic 'ink', which could be used in ultra-thin screens that read like paper. Don't expect to see this technology anytime soon, though.



## Bus speed

Also undergoing a major revamp is PCI, the I/O bus technology used to connect the processor to other PC components found in expansion slots. AMD's Hypertransport technology can reportedly transfer data as quickly as 6.4G per second, compared to PCI's 266M per second. Intel claims that it is working on a more radical breakthrough that will mean the speed of I/O technology increases from a maximum 66MHz for PCI to more than 10GHz. For even faster speeds, motherboard manufacturers may have to switch from copper wiring to optical fibre.



## Storage

Like processor speed, storage space has multiplied at a phenomenal rate since the early 1990s. IBM and other manufacturers sell hard drives capable of storing 70G or more. And many people believe there's a way to squeeze even more out of current technology. For instance, IBM is using ultra-thin metallic layers to increase the storage capacity of the disks inside hard drives. If you believe the hype, this might mean that storage could eventually jump from about 20G per square inch to 100G. If this is true, a 400G hard drive might eventually be possible. Still, other factors could limit storage growth; until recently, single ATA hard drives could hold no more than 137G. Maxtor now claims to have surpassed this limit.





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# Best of show

*PC Expo — now part of the Technology Exchange Week, New York — has long been a tech mecca for PC buyers, sellers and voyeurs. David Flynn presents the highlights of this year's event.*

## DVD delights

As recently as last year, the notion of a DVD writer in a PC was fanciful. However, at PC Expo, Panasonic showcased two products intended to bring DVD burning to the masses.

The DVDBurner, which has already hit US shelves at \$US599, is an ATAPI internal drive that works with write-once DVD-R and rewritable DVD-RAM media.

In the lounge room, the DMR-E20 recorder ditches video tape for DVD-R and DVD-RAM discs. It writes to dual-sided DVD-RAM discs, so you can record up to 12 hours of programming. It can also digitise analog feeds from your VHS-C or Video8 camcorder and allows basic video editing on your TV screen. Panasonic is aiming to release the recorder, priced at \$US1,500, before the lucrative Christmas period.

## Get the picture

How big can LCD monitors get? Viewsonic lifted the curtain on a mammoth 20.1in display, expected to retail for \$US3,300, and an even larger and lusher 23.1in panel with a painful \$US6,300 pricetag.

How low can LCD prices go? So far, down to a hard-to-resist \$US499 for Viewsonic's new entry-level 15in flat-screen desktop monitor. At this rate, CRT screens will soon be moving off the desktop and into the garage sale.

How far away can your display get from your PC? Up to 50m, if you're using Panasonic's ProNote Air FG notebook. The display panel detaches from the system unit and can run for up to five hours on its own battery, according to Panasonic. It's yet another wireless

product — further proof that the 802.11b standard is gaining momentum. The touch-screen display also incorporates an 8M SDRAM buffer to store viewed pages and allow you to keep working when communications are momentarily disrupted.





## You gotta hand it to 'em

The handheld market may be soft, but that hasn't stopped several leading manufacturers from pursuing new opportunities.



Sony announced its second generation of Clie pocket rockets. The colour N610C will retail for \$US400 and has a 16-bit display with 320 by 320 pixel resolution, which is twice that of conventional Palm OS-based handhelds.

The N610C and the mono S320 have been upgraded to Palm OS 4.0 with a standard 8M of RAM and, like their predecessors, use Sony's chewing gum-sized MemoryStick for loading additional programs and data files.

Microsoft loyalist Casio will move deep into Palm territory with its new \$US300 BE-300. This will be one of the cheapest Windows-based Pocket PCs on the market, and it includes a PC Card slot and 320 by 240 pixel colour screen. The most serious handicap will be the 166MHz engine, which is woefully underpowered for the resource-hungry Windows CE 3.0 operating system.

Compaq was determined to build on the success of the iPaq and showed off several backpacks, which added everything from Bluetooth and a GPS receiver to barcode scanners, a point-of-sale credit card reader and a GSM phone to what is considered the best Windows-based handheld.

Handhelds are expected to help lead the update of wireless networking with the 802.11b technology. Xircom strengthened its position of leadership in this area with a \$US300 snap-on WiFi module for Palm m50x handhelds. The module's data rate ranges from 1Mbps to 11Mbps, and the lithium ion battery is automatically recharged

whenever the handheld sits in its docking cradle. Xircom has previously announced plans to ship 802.11b and Bluetooth cards for the Handspring Visor.



## Graphics grunt to go

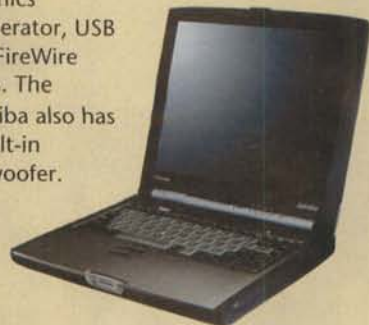
Toshiba stole the mobile show with the release of its Satellite 2805, which will be branded locally as the 2800/15 and sell through the retail channel for \$6,500. It's among the first notebooks to use nVidia's mobile-friendly and cutely-named GeForce2Go chipset, which boosts graphics performance by shouldering the burden of pixel pumping that usually falls to the CPU.

This gives the 2800/15 a clear edge when it comes to multimedia-intensive tasks and brings notebooks as a whole one step closer to being true desktop replacements for video, 3D applications, games and DVD playback.

Another radical inclusion is the Smart Media slot. Toshiba intends to introduce

the slot into the entire product range by early 2002 as a common 'bridge media' to span the data divide with smaller devices such as MP3 players.

The floorplan includes a 900MHz Pentium III, a standard 30G hard drive and 128M of memory, 6x DVD-ROM and 4x CD-RW combo drive, a 15in TFT active matrix screen with 4x 3D graphics accelerator, USB and FireWire ports. The Toshiba also has a built-in subwoofer.



## Take two tablets, and email us in the morning

Among the many companies that jumped onto the 'tablet PC' bandwagon at PC Expo was Viewsonic. The company is best known for making displays, and it intends to make use of that expertise in its ViewPad 100 and 1000 tablets, both of which will cost about \$US1,000.

Tagged as a 'Super PDA', the ViewPad 100 is about the size of an A4 notepad and weighs 1.1kg including rechargeable lithium ion batteries. The Windows CE 3.0 OS and bundled applications are partitioned in 32M of flash memory, and there's another 64M for loading

third-party software and storing data. The 10in TFT touch-screen with 800 by 600 resolution supports pen input as well as tapping on a virtual keyboard. Viewsonic has opted for Intel's 206MHz StrongArm chip, and has added a bevy of connectivity options such as dual PC Card and CompactFlash ports, USB, Ethernet and infra-red.

The ViewPad 1000 is closer to the traditional concept of a PC. The blueprints reveal an 800MHz Mobile Celeron and 6G hard drive with Windows 2000 pre-installed. Bonuses include a built-in digital camera and 802.11b wireless networking.





## Hook it up

Last year's PC Expo saw the announcement of the HomePlug Powerline Alliance, a consortium of leading suppliers (among them 3Com, Cisco, Hewlett-Packard, Intel and Motorola) that sought to connect PCs and other devices to home-based networks through conventional AC power lines.

At this year's show, the group announced that the HomePlug 1.0 specification had been finalised and that the first products should be released before year's end. The data rate is expected to peak at 10Mbps, which is sufficient for gaming, streaming audio and video clips.

## Upgrade on a card

What's the fastest way to upgrade an ageing PC? Perhaps with Powerleap's Renaissance 370S, which packs a processor (your choice of Celeron or Pentium III), integrated 4x AGP graphics and 128M of RAM onto a single ISA card for \$US270. On-card expansion options run to two Ultra DMA IDE interfaces, VGA, Ethernet, USB, serial and parallel ports.

## The road warrior's rodent

Combining optical technology with a featherweight size, Logitech's new MouseMan Traveller is designed for mobile mavens tired of pointing sticks and touchpads. The optical pickup makes it super-accurate—and you don't need a mousepad. Due out in October, the USB device works with both Windows and Mac notebooks.

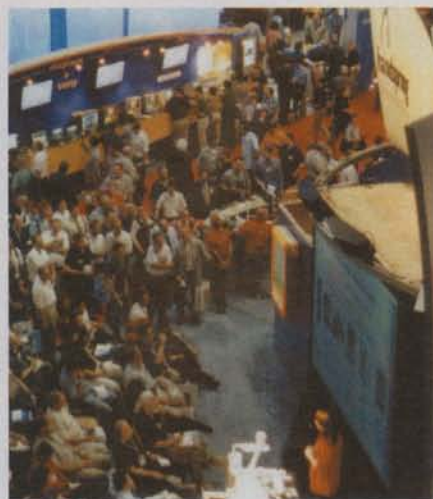
## Mo' memory

Several new modules for Handspring Visor handhelds made their debut at PC Expo. The most alluring was the MemPlug CompactFlash adaptor (\$US50 from Portable

Innovation Technology). Drop it into your Visor's Springboard slot and you add affordable solid-state CF storage of up to 256M to your handheld.

## Intel (finally) gets it

A longtime champion of the HomeRF wireless networking system, Intel has at last fallen into line with other major manufacturers and announced the first of its 802.11b products for the consumer space. Its Wireless Gateway contains a WiFi access point with built-in router and firewall, and will retail for \$US300. Buyers must supply their own 802.11b desktop or notebook cards.



## Think big

Really, really big. That's the message from Maxtor, the company that is leading a consortium of hardware and software manufacturers in an effort to raise the roof on current hard drive capacity. ATA drives currently top out at 137G. Sure, it'll be a few years before a 137G drive is too puny, but why wait? Before that limit is reached, the 'Big Drive' initiative is expected to upgrade the ATA interface to a maximum capacity of 144 Petabytes — or 144,000G. That should do us for a while longer.

## Sound unlimited

Technology usually advances by making larger things smaller, but digital audio players show signs of going the other way. For example, MP3 decks for the living room are appearing, fitted with a ready-to-rip audio CD drive along with a hard drive that can store weeks' worth of music.

Compaq's iPaq Music Centre, announced at January's Consumer Electronics Show in Las Vegas (and shown



above), is still to be released, but Hewlett-Packard has already upped the ante with the Digital Entertainment Centre (DEC). The Linux-powered DEC has almost twice the music storage capacity of the iPaq (the 40G drive is said to be equal to 750 CDs recorded at 128Kbps) and includes a CD-RW drive that not only rips tracks from CDs into MP3 and RealAudio format, but can also write your favourite digital mix directly back to disc. The deck also has USB sockets for downloading tracks into a personal audio player, and can access a dedicated DEC online portal jointly run with RealNetworks. Here, owners can download music and listen to streaming Net radio channels. The price is expected to be close to \$US1,000.

Another take on the MP3-CD combination is Teac's \$US129 Beatman, a portable disc player that uses 8cm CDs with a capacity of 180M, or about three hours of high-quality music. A 40-second buffer provides skip protection on the bumpiest of jogging tracks, and the pair of AA batteries it takes are said to last seven hours.

## Quite a handful

It wasn't all that long ago that a 5G drive was a source of amazement, especially if it was jammed into your notebook. Now it's just the next step in expanding your mobile data storehouse, thanks to Toshiba's 5G PC Card hard drive. The drive slips into any Type II PC Card slot, but carries a not-so-small \$US500 pricetag.



## Evo-lution of the species

The 'PC' in PC Expo stood for portable computing more than anything else. Portable technology is evolving rapidly — for example, Compaq's Evo 'Dual World' notebook has mutated and extended its habitat to the desktop.

On the road, the concept hybrid machine is a conventional notebook, but back at base, the wireless keyboard and mouse can be positioned wherever you sit. The notebook's base extends to raise the 15in LCD screen to a more ergonomic height.



FEATURE *DIVX;-)*

# The dawn





# of DivX;-)

*DivX;-) has been rocking the world of online movies, but does it really have what it takes to become the next MP3? **Daniel Gardiner** investigates.*

**D**uring the last 18 months, a small piece of software has been making its presence felt in the online underground. The fledgling video codec known as DivX;-) has gained a dedicated following — albeit an illegal one — committed to trading movies online. Will DivX;-) be to DVD what MP3 is to CD?

## Codec convergence

In the second half of 1999, a small utility called DeCSS was released. Its creation is usually attributed to Jon Johansen, a 16-year-old Norwegian programmer. The original purpose of the program was to allow Linux users to play DVDs, a function so far denied to fans of the OS, thanks to the Content Scramble System (CSS) and the lack of any official software-based players. The CSS is specifically designed to prevent a disc from being played back on unauthorised players, which means you need to have a particular piece of software to unscramble the signal and watch the DVD.

Johansen posted DeCSS on the Web so that Linux users would finally be able to use their PCs to overcome the problem. However, what DeCSS inadvertently allowed people to do was to strip the DVD's movie files of their encryption completely, and create entirely new copies on hard disk. Without encryption, the DVD could theoretically be edited and modified in the same way as other media files on the PC. This would have made them incredibly easy to pirate — except for the fact that a two-hour DVD movie is usually over 4G in size. Converting them to other, less space-intensive video formats (such as VideoCD) results in a massive loss of quality.

Johansen soon found himself at the centre of an international storm of controversy, charged with creating a tool to

circumvent copy protection. (American free speech activists are still fighting against the US judicial system and the Motion Picture Association of America over DeCSS-related issues.)

This would all just have been incidental, but at around the same time, a hacked version of Microsoft's high-compression, high-quality MPEG-4 version 3 video codec turned up on the Web. (For more on codecs, see page 88.) The original version 3 codec was being widely used in Microsoft's proprietary Advanced Streaming Format (ASF), but the company had strictly curtailed its use in other file types. A small group of coders had other ideas, however, and decided they'd release their own tweaked version of Microsoft's closely guarded codec. Paying tongue-in-cheek homage to Circuit City's failed distribu-

## Circuit City's DIVX

In 1998, American electronics chain Circuit City came up with the idea of a DVD rental and purchase system known as Digital Video Express, or DIVX. It was effectively pay-per-view for DVDs. Discs needed a special DVD player with a built-in modem to gain access to a central billing database — you had the option to pay on a per-view basis or purchase the disc outright, but in order to authenticate any of this, the player needed access to a phone line. The system quickly attracted heavy criticism from electronic libertarians and DVD fans. The format was officially abandoned by Circuit City in mid-1999, the company claiming lack of support from movie studios as the reason for its demise.



## Video codec basics

Almost the entire DivX community is based around the DivX;-) codec. At the most basic level, a codec is an algorithm for compressing and decompressing audio and video files. Codecs work in a similar way to programs like WinZip or WinRAR — they transform large files into smaller ones to make them easier to transport. Most codecs do this by stripping a selected file of any unnecessary data. The MP3 codec, for example, compresses audio files by removing the parts of a song that are inaudible to the human ear.

Video codecs, on the other hand, usually work by exploiting repeated imagery from one frame to the next. In scenes without much action or movement — which usually make up the bulk of a movie — the differences between one frame and the next are usually fairly small. Many codecs use this to their advantage, only modifying the parts of the image which change from frame to frame, rather than the entire frame. This means, for example, that a scene in which two people are talking (where there is very little movement) is much easier to encode than a car chase (where there is a lot of movement).

It's important to realise that codecs are different from file formats — even though they are sometimes closely intertwined. A grossly simplified example is to imagine the file format as the envelope in which a letter is sent, while the actual letter is the codec. The envelope gets the letter delivered to its destination, while the letter itself contains the important information. Apple's Quicktime MOV format supports numerous different codecs, as do MPGs, AVIs and most other video file formats.

In Windows, most video and audio codecs are automatically downloaded or installed when required. However, thanks to its somewhat questionable legal status, the DivX;-) codec must be downloaded and installed manually. See [www.divx.com](http://www.divx.com) for more information.



tion system (see below), the group produced DivX;-) by modifying Microsoft's code and cobbling it together with MP3.

Using MP3 to compress the soundtrack, it wasn't long before people were turning to DeCSS to rip their DVDs and then convert them to DivX;-). The DivX;-) online community has been growing rapidly ever since, fostered mostly by support from the warez underground. Pirated DivX;-) movie releases can exceed 20 titles on a 'good' day, and like the DVD market, they are a mixture of the latest movies and popular classics.

Due to the dubious legal standing of the codec, it's rare to find any legitimate sources that use it. One notable exception is The Internet Archive ([www.archive.org](http://www.archive.org)), which hosts hundreds of movie files from public domain archives. It offers two flavours for downloading a file: a DivX;-) encoded AVI file, or its MPG equivalent. Frequently, the DivX;-) file is at least eight times smaller, or about 15% of the size of the MPG. When you have the option of downloading a 250M file or its 30M equivalent, the choice is obvious.

## Will the real MPEG-4 please stand up?

Also known as DivX 3.11 alpha, DivX;-) is based on hacked versions of Microsoft's MPEG-4 version 2 and version 3 codecs. MPEG-4 is the latest video standard from the Moving Picture Expert Group — an international effort to create widely accepted standards for digital video. Its predecessors, MPEG-1 and MPEG-2, are well known across the video industry and have had widespread use and acceptance. Most DVD players support both standards.

Pioneered in the late 1980s, MPEG-1 is perhaps best known as the format that video CDs (VCDs) use, and was originally designed to rival the VCR in terms of quality. It is also the codec used by most MPG files found on the Web. MPEG-2 was developed shortly afterwards as a higher bandwidth solution, allowing for much higher quality than videotape could provide. MPEG-2 has since become the standard upon which DVD video is based.

The International Standards Organisation hopes to revolutionise digital video for the Internet age with MPEG-4. This isn't just a PC-based format — several

major electronics companies have recently announced that they are working on MPEG-4 hardware decoder chips, so the first set-top players could start appearing within the next 18 months. MPEG-4's focus is on increasing video interactivity, while maintaining low bandwidth and high picture quality.

Unlike DivX;-), therefore, the MPEG-4 standard is not specifically a new way of compressing and decompressing video. One of the key ideas behind it was to allow developers to boost the interactivity of digital video. Using MPEG-4, specific video objects can be selected — a fish can easily be made to change colour, or people can be added or removed from scenes. It should also allow 2D and 3D objects to be mixed.

MPEG-4's development officially reached version 2 in late 1999, and this version achieved International Standard Status in early 2000. Work still continues on enhancing certain aspects of the standard, but to all intents and purposes, the major aspects are finished.

This does not mean there is much software to support it. The standard sets out rules and regulations regarding the way codecs must be implemented and provides a basic toolset; third parties (such as Microsoft and other media development companies) are then free to go off and use this toolset to build their own applications and encoders.

Paradoxically, although it is based on MPEG-4, version 3 of Microsoft's codec is not compatible with the official MPEG-4 standard. Jordan Greenhall is one of the founding members of upstart DivXNetworks, a company that is trying to legitimise its own version of DivX;-) as an industry standard. In an interview with [theneteconomy.com](http://theneteconomy.com) earlier this year, he posited that the codec may have been engineered to be "strategically incompatible with MPEG-4". This means that (early adopters beware) because it is based on the version 3 codec, DivX;-) is not compliant with MPEG-4. This is a major setback to DivX;-)'s chances of cutting it as a legitimate video codec. DivX;-) encoded movies will only ever play on machines equipped with the DivX;-) codec. Thus, unlike other MPEG-4 compliant codecs, DivX;-) will probably be forever bound to the PC.

## Getting DivX out of the ghetto

The DivX;-) scene has come a long way since 1999. Ripping and converting a





DVD used to be a long and arduous task, and while it still takes a great deal of time, a new generation of free tools has made it easier than ever. It's also still illegal. Although Microsoft hasn't yet filed any suits attempting to stop distribution of DivX;-) (doing so probably wouldn't do much to halt its use), any instance of DeCSS has to be hosted on a site outside the US, because it has been made an illegal piece of code there.

For the most part, the DivX;-) codec's legal status has kept it firmly underground. Theoretically, Microsoft could file suits against anyone using DivX;-) — especially for legitimate purposes — as it contains copyrighted Microsoft code. Several groups in particular have been attempting to address this problem by creating entirely new high-compression MPEG-4 codecs from scratch.

## Can DivX go mainstream?

DivXNetworks announced earlier this year that it was developing a new, open source, high-compression video codec for widespread use. Up to this point, developers and dabblers alike have been limited to a few choices from companies such as Microsoft, Apple and Real Media — most

of which have to be paid for. Called OpenDivX, about the only thing the new codec shares with DivX 3.11a is the name.

DivXNetworks has also employed Jerome 'Gej' Rota, one of the coders behind DivX 3.11a. Its stated goal is to make OpenDivX the format of choice for high-compression, high-quality video. The DivX name is already fairly widely recognised, and there's no doubt that DivXNetworks is hoping to cash in on this. After all, what worked for the MP3 name should translate to DivX, right?

Not necessarily. The existing community's response to OpenDivX has been mixed. It has garnered support from many open source fans, and converted some of the people using 3.11a. However, those doing most of the pirate encoding and distribution are still using their tried-and-true favourite, DivX 3.11a. Many fans of the original have openly criticised the new codec, complaining that its compression is not quite as efficient as its illegal counterpart, although the OpenDivX codec does seem to be getting more robust with every release.

Other groups are attempting to carry the DivX;-) flame in spirit, if not in name. The Happy Machine group has created 3ivx ([www.3ivx.com](http://www.3ivx.com)), another codec which produces similar results to DivX 3.11a.

Will DivX produce a revolution in the way movies are distributed online? It's one thing to have support from the warez community, and another step up to have the open source community on your side. Without backing from major media companies, however, video codecs still have little chance of taking off.

The question of legitimate sources using the codec seems to hinge mainly on the inclusion of copy protection (most likely in the form of Digital Rights Management), and compliance with industry standards. DivXNetworks plans to capitalise on the success of OpenDivX by producing its own high-end version, which it hopes will encourage more security-conscious clients to take the plunge.

APC recently spoke to Rob Hewitt, who is in charge of video encoding for The Internet Archive. He said that the decision to use DivX;-) was a temporary one, but now that OpenDivX encoding has improved, The Internet Archive plans to upgrade to the more legitimate sibling.

In the meantime, the more people who use DivX;-) or any of its counterparts, the more widely spread freely encoded, high-quality video will become — and the more pressure there will be for large companies to play ball.

## Download your own

DivX;-) isn't just about ripped DVDs. Although DivX;-) is mostly used for movies, it's also common to find the latest episodes of popular TV shows.

Finding DivX;-) files online is easy, if you know where to look. It's downloading them that's the troublesome part. Like most underground communities on the Web, the subcultures that have formed around DivX;-) usually consist of two or three different types of people. At the centre are the more hardcore users: Internet movie fans who dedicate a large amount of their time to gathering and redistributing movies. These are the people who specifically host DivX;-)



movies and run the IRC channels that facilitate the distribution of files and FTP sites. Then there are people who are seeking specific movies.

APC decided to try to track down the much-rumoured Star Trek: Voyager double episode finale. A quick search of IRC (using [searchirc.com](http://searchirc.com)) turned up a multitude of channels hosting Star Trek episodes. We picked some of the more promising ones and dived right in.

Less than 10 minutes later, we'd found an FTP site that hosted the episodes we were looking for. We couldn't log on immediately, though; we

had to queue up with numerous other people who were also trying to get the episode. So we waited. And waited some more. After about 45 minutes, we managed to get onto the site and begin our download. The speed averaged about 15 to 20Kbps.

The episode was split into two files, and each one was roughly 230M. Picture quality, as you can see, was far from spectacular, but then again, it was probably converted from a televised version. The total download time (after being booted from the FTP server several times) was approximately five hours.





# Up close and personal

APC conducted its own set of trials to compare the quality and file sizes of DivX;-), DVD and VCD. We focused on getting as close to DVD quality as possible, while still managing to fit the movie into about the same amount of storage space as a VCD — less than two 74-minute CDs. On the Net, most movies that run for over one and a half hours are made to fit onto two or more CDs, so we chose to do the same.

The picture to the right is the still frame from our DVD original — for each codec, we zoomed in on a particular section so the quality is more apparent.

It's important to remember that still pictures can only indicate so much about a video codec — you have to see them in action to form an accurate judgement.



## DVD (MPEG-2)

DVD is the benchmark for high-quality video images and maintains good frame rates, thanks to the ample space on the disc. As the table shows, the average bit rate on this particular DVD was around 6,500Kbps, at least five times higher than either of its contenders. Dolby Digital and DTS both take up large amounts of space as well.

**The verdict:** DVD creams the current competition in terms of picture quality (although this could change in the next five years), and sound is far superior to anything else. Not surprisingly, such quality requires a great deal of space, so it is effectively limited to DVD discs.



Type	Resolution	Bit-rate	Sound	Frames per second	Total file size	Download time at 128Kbps
DVD (MPEG-2)	720 by 576 (PAL)	Variable; average 6,500Kbps	Dolby Digital 5.1	25	6.5G	14 hours

## VCD (MPEG-1)

A somewhat old format, and now definitely showing its age, VCDs are severely limited by their low resolution of 352 by 288 pixels. They tend to be slightly out of focus when bumped up above their default resolution. Sound is fairly average, but like MPEG-1 video, it's based on very old specifications. Picture quality sometimes dropped rapidly in some of the faster motion scenes.

**The verdict:** a fairly robust format, if somewhat space-intensive for what you get. VCD has been ageing rapidly, thanks to the high expectations brought about by DVD. Overall, it sits in an uneasy middle ground as a format, suitable for both PC and set-top players, which just about everyone can use (not everyone has DVD capabilities on their PC).



Type	Resolution	Bit-rate	Sound	Frames per second	Total file size	Download time at 128Kbps
VCD (MPEG-1)	352 by 288 (PAL)	Fixed; 1,150Kbps	MPEG-1 stereo (224Kbps/44.1KHz)	25	1.29G	2 hours 45 minutes

## DivX;-)

We encoded at DVD resolution in order to test claims of 'near-DVD quality'. The file size was cut down greatly due to the fact that it was encoded without the black bars at the top and bottom of the screen (unlike VCD and DVD). The overall picture quality was high. We used a smart bit-rate encoder to reduce the overall file size by varying the amount of compression that was required for different scenes. Occasional flickers and screen artefacts were apparent in high-action scenes, but picture crispness and quality were both good.

**The verdict:** expectations were high for this contender, and overall it did not disappoint. The limitation to playback on the PC can be overcome with a good video card that has TV-out support, but it's still not as good as DVD in terms of sound or picture quality when played back on a TV.



Type	Resolution	Bit-rate	Sound	Frames per second	Total file size	Download time at 128Kbps
DivX;-) (Microsoft MPEG-4 versions 2 and 3)	720 by 300	Variable; average 1,120Kbps	MP3 (192Kbps/44.1KHz)	25	1.2G	2 hours 30 minutes



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# The PC guru

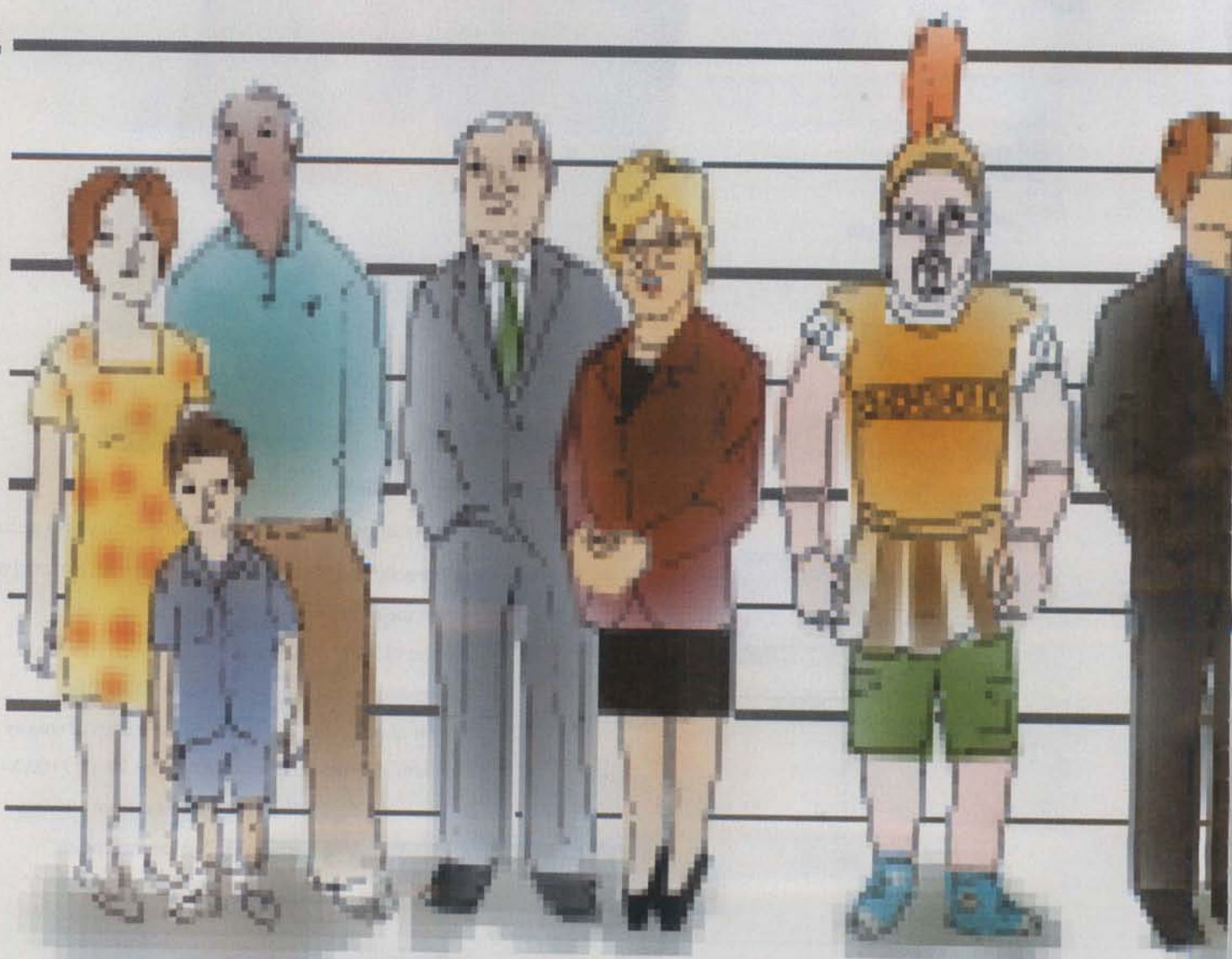
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64

32



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# cheat sheet

*As an APC reader, you're probably seen as the resident computer guru. So what do you do when your friends, family and workmates ask you for advice on what sort of computer they should buy? **Darren Ellis** uncovers the best and safest bets for all needs.*

**H**ere at APC, we're often asked put on our consulting hats for family and friends, and of course we're too kind to charge \$50 an hour for our sage words. Choosing the 'right' PC is no easy matter. Different people have different needs: balancing the finances, running a business and blasting aliens all demand vastly different PC configurations. If your friends and family are looking to you for guidance, it's easy to feel daunted.

However, life is just about to get easier. APC has taken the pain out of the process with this computer crib sheet. It will help you to identify the unique requirements of different computer users quickly, from students and small businesses to digital video mavens. It then details the essential components and target specifications for each, and explains why the very latest hardware isn't always the right choice. In some cases, a preconfigured package deal is the way to go. In others, a 'roll-your-own' PC, where an individual combination of processor, memory, hard drive and so on is devised, is the best bet.

With the aid of APC Labs, we've scoured the market, evaluated the leading contenders, and found the best machines to get your disciples smiling. And we've done so within a strict \$3,000 budget. That's sure to make your friends worship you all the more!



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Published by ACP Tech, a division of ACP Publishing Pty Limited ACN 053 273 546

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## Business workgroup

Many major computer manufacturers produce extremely well-designed systems for the business sector. Some are capsule-like units where there's little or no need to dig around inside, but others have a more standard PC design. Most have a small footprint and are perfect for the desktop.

For \$3,000, it is possible to get not one but two desktop PCs for a



new business or expanding workgroup. Many cost-cutting tricks can be used here; for example, a soundcard, video card and most extra software are generally not necessary. Choosing between a 15in or 17in monitor depends on the needs of the individual user or manager.

Spare funds should go towards the memory. 64M is fine for basic office work, but increasing to 96M or 128M makes a big difference. Hard drive size is less critical, so the 6G minimum that

### APC recommends

It's possible to get *three* systems for \$3,000, but not if you want big-name brands. For business use, APC suggests buying respected brands, because they usually offer reliable warranties and after-sales support.

Many systems fit this category perfectly, yet cost as little as \$1,200 to \$1,500. Dell's Dimension L700cx is a good example. APC opted for a system with a 800MHz Celeron processor, 64M of RAM, 10G hard drive, 15in monitor, CD-ROM and network card, which came in at \$1,454. We'll take two!

most manufacturers provide is more than adequate. Windows NT or 2000 is the best choice for the OS, but this depends on which OS the company is currently using. Each of the workstations should have a network card integrated onto the motherboard or included with the system.

## The family



Choosing a PC for a home can be harder than choosing one for business, as it must fulfil a wide variety of functions. These can include watching the budget, helping with homework or running a casual business, none of which require much grunt; or digital photography and gaming, which can push basic systems to the limit.

For most people, this is their introduction to computing. They need something that's easy to use, stable, has worthwhile extras and a solid warranty. These factors have to be compared between systems, so don't make a hasty recommendation or you'll spend your weekends giving tech support.

The basic checklist for a family PC should include an AMD Duron or Intel Celeron processor from 700 to 800MHz, a minimum 64M of RAM (which could be bumped up to 128M for faster processing and future-proofing), a 10G hard drive and a 56K modem. Windows Me is our recommended OS, but some machines still come with Windows 98, so get it upgraded to Me.

There should be plenty of change from \$3,000. In fact, there will probably be change from \$2,000, even if a colour printer and scanner are added to the package.

### APC recommends

Most PC manufacturers have machines for families, but it's the name-brand packages that excel. One-year warranties are just about standard, and you can often get an extra two years for between \$150 and \$200. These systems often come with mountains of software; some of it useful, most of it not. Trying it out is a good way for novices to cut their teeth.

APC found two systems that stood out. The Dell Dimension L 700cx desktop (based on a 866MHz Pentium III) costs \$1,846. For the very price-conscious, and for everything necessary to keep your friends out of your hair, have a look at Hewlett-Packard's Pavilion Home PC. It has an Intel Celeron 666MHz processor, 64M of SDRAM and a 15G hard drive. It also has a comprehensive range of software, a CD burner and an internal modem, and costs only \$1,399, which leaves plenty of money to spend on printers and scanners.



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## The gamer

Gaming addicts don't often need advice on which PC to buy — they're probably able to build the machine themselves. However, there are plenty of novice gamers looking for help. The gaming PC is often used for homework and Web access as well (at least, that's what gamers tell their folks), but it's going to spend most of its time fragging and fighting.

The ultimate gaming machine costs well over \$6,000, but you'd be amazed at what you can get for \$3,000.



There's no need to aim for the very latest video card. A GeForce2 card with 64M of DDR SDRAM can handle any game currently on the market, and costs between \$300 and \$600.

The Pentium 4 has achieved incredible frame rates for Quake III Arena in APC's tests, but AMD's Athlon is much cheaper, especially if you add expensive RDRAM to the Pentium 4.

For solid game performance, 128M of RAM is essential. It speeds up any game and future-proofs your system for game releases for the next few years. You should also aim for at least a 15G hard drive, because many of the new games require 1G or more for a full installation. If you can get 20G or more, you won't regret it.

You don't want to leave yourself short for graphics and audio. A 17in monitor is fine for graphics, but if your budget can stretch to it, a 19in screen is even better.

A good soundcard and speaker combination adds excellent atmosphere to your gaming experience. The SoundBlaster Live card is now the industry stan-

### APC recommends

The challenge is to find a machine for under \$3,000 that has most of what you need: graphics, processing power, audio and RAM. For \$2,899, Gateway's Select 1300 does the job nicely, thanks to a 1.3GHz Athlon processor, 128M of SDRAM, 40G hard drive, 17in monitor, SoundBlaster Live Value soundcard, Boston Acoustics speakers and 32M nVidia GeForce2 MX graphics card.

The Intel alternative is the Dell Dimension 8100, with a 1.5GHz Pentium 4, 128M RDRAM, 20G hard drive, 32M nVidia GeForce2 GTS DDR graphics card, 17in monitor, SoundBlaster Live Value soundcard and Harmon Kardon speakers. This is a little less expensive than the Select 1300 at \$2,797.

dard, and is superb for gaming. Don't settle for an average pair of speakers until you've heard a full surround sound combo including subwoofer.

## Small business

PCs are vital to most forms of business. However, many small business buyers rush into purchasing without stopping to examine their unique needs.

Is it for word processing and email, book-keeping and records, inventory control or even demonstration purposes?

Every business has different requirements, and some items can be downgraded or removed from the computer package to lower the price. This makes buying from a supplier that offers customised configuration a very good idea.

Everyday business applications, such as Microsoft Office, or accounting packages, such as MYOB, require very little graphics power, but almost every PC on the market is fitted with some form of 3D card. Business applications have no need for 3D, so if you can swap this for a lesser card, do. You won't notice the difference. The same goes for the soundcard.



If the PCs will be hooked up to a network, you might be able to forego the modem altogether. A 10G hard drive is definitely large enough, but one this small might be hard to come by. Go for the smallest hard drive offered — even if it's 15G, it will be more than enough for years. You can also save some money by opting for a 15in monitor rather than a 17in one, but that might be taking thrift a little too far!

Don't settle for anything less than 64M of memory. Many suppliers try to reduce the price by pegging RAM to 32M, but this is a false economy, even for office applications.

You'll notice a solid performance gain if you specify 128M of memory. For your operating system, APC suggests Windows 2000. To back up your business data, either a CD-R drive or an Iomega Zip drive will do.

When you begin your search, ignore the top-end systems. Those machines are

### APC recommends

At \$1,599, Gateway's Essential 800 is such good value that you could almost buy two. It has enough juice for the job, has next to no hidden costs for extras, and comes with Microsoft Works. Windows Me is installed, but although it's adequate, you should consider upgrading to Windows 2000 for an extra \$275.

IBM's small and sleek NetVista units are designed to conserve precious desktop space. These machines are excellent for business as they contain few extraneous inclusions that would complicate matters. Basic configurations begin at \$1,399.

overkill for the relatively modest needs of a business. Set your sights a little lower, because that's where you'll find the systems that were the very best barely a year ago. If they were top-of-the-range for business applications then, they're certainly more than enough for the office today.



# The home movie enthusiast



Anyone settling into the director's chair will find that the price for a suitable computer setup doesn't fall much below \$3,000, whether the machine is for a compulsive shooter who can't stop filming family functions, or for a beginner tinkering with a new digital video camcorder.

The very first item on the checklist should be an IEEE 1394 (more commonly known as FireWire) port on the PC. This is the standard way to move footage between camcorder and com-

puter, especially for a DV camera. FireWire ports are still rare on most PCs, but larger manufacturers offer them as options. Alternatively, you can install a FireWire PCI card. Some cards come on their own, others are supplied with software as part of a DV editing kit.

Video editing requires a lot of resources; 128M of RAM is the starting point, but you'll need to be prepared to step up to 256M to get serious with DV.

Aim for a hard drive of 20G or more, because all that digitised footage takes up plenty of space. After some price cuts, the Pentium 4 has become the chip of choice for Windows DV fans.

The sky is the limit when it comes to digital video editing. The more memory, hard disk space and processing power there is, the less time it will be necessary for the user to spend loading footage, rendering effects and transitions, and compiling the home movie.



## APC recommends

In spite of the Windows versus Mac controversy, Apple's iMac is the clear winner. The system APC configured costs \$2,705 and is based on the 500MHz G3 processor. It has 128M of RAM and a 20G hard drive. A CD-RW drive, two FireWire connectors and Apple's iMovie 2 software are also included.

This is *everything* a video editing enthusiast needs to get started. The only drawback is the iMac's 15in monitor, which is less than ideal for people planning to spend a long time editing onscreen.

Those who are wedded to Windows should look at the Dell Dimension 8100. The price for a 1.5GHz Pentium 4 processor, 128M of RAM, 20G hard drive, CD-RW drive, FireWire card and MGI VideoStudio III movie editing software, as well as a 17in monitor, came to \$3,000.

# The student

The typical 'best value' system for a student is very similar to that recommended for the family. It has to be an all-rounder, balancing boring homework with gaming and digital music capabilities.

This machine doesn't need the fastest processor, the biggest hard drive or anything else from the top shelf. It can be as simple as you like, but remember, games will be less fun if you cut back on graphics cards and the sound system.

APC considers the essentials for a student PC to be a 15in monitor, 64M of RAM and a 10G hard drive, along with a 56K modem. This is a common configuration



and comes in well below the \$3,000 mark, so there's plenty of room for upgrading parts to make a better system. Most students need a printer, and plenty of good colour inkjets are available from Canon or Hewlett-Packard for about \$300. These are often included with budget-priced packaged systems.

The processor doesn't have to set the world on fire. The slowest processors available run at a speedy 650MHz, which is more than adequate for business applications, gaming and the Internet.

Many students are shifting their preferences to notebooks, but this can be an expensive route to take. Unless the notebook will be used to take notes at lectures, a cooler



## APC recommends

The Hewlett-Packard Pavilion Home PC 6726 has a friendly, easy-to-use design. Based on a 667MHz Intel Celeron with 64M of RAM, it comes with a CD-RW, 15G hard disk, Windows Me and speakers. Including a basic 15in monitor, the price is \$1,776.

The pick of the Palms for basic use is the m100 or m105. The \$369 model m100 is the cheapest, and comes with 2M of RAM, but doesn't have a desktop docking cradle.

APC's pick is the m105, which gives you 8M of memory and a cradle for \$499. Both can be dressed up with coloured faceplates, if you're into that sort of thing.

alternative is a Palm handheld, which, like a mobile phone, is as much a social tool as anything else. A decent PC for your desk and a Palm for your purse or pocket should set you back no more than \$2,300, provided you make the right choices.



# The traveller



Some notebooks have big screens and large drives, but they're rather unwieldy, and are usually best left on the desk. These can be ruled out immediately for travellers.

The more frequently notebook users travel, the more they'll value compact size and light weight (along with battery life) above desktop-like performance. APC has excluded sub-notebooks from this category, because travellers usually need a fully equipped notebook.

Anything weighing in above 3kg won't do, as it is simply too heavy to lug around for long. Be careful, because the weight quoted by the manufacturer usually doesn't include the power brick or any external drive modules. These can add a few kilos to the total.

APC recommends notebooks with the CD-ROM and floppy drives installed internally, a hard drive with at least 6G of storage, 64M of RAM and a 13 to 14in display. Don't scrimp by choosing a passive matrix screen — it gives muddier images than a crisp active matrix TFT panel.

Most notebooks last between two-and-a-half to three-and-a-half hours between

## APC recommends

APC went looking for a notebook that won't let travellers down, but costs less than \$3,000, and we settled on two winners. Both have almost identical specs, including active matrix TFT screens. And both tip the scales at just over 3kg, including power supply and cable.

The Compaq Armada 110 is one of the blandest boxes around, but it contains a 700MHz Celeron chip, 64M of RAM, 10G hard drive, 12.1in display and an internal CD-ROM, all for \$2,595.

Toshiba's Satellite 1730XCDT is a good alternative. Based on a 650MHz Intel Celeron processor, the unit also has 64M of RAM, a 10G hard drive, 13.3in display and an internal CD-ROM drive for \$2,750.

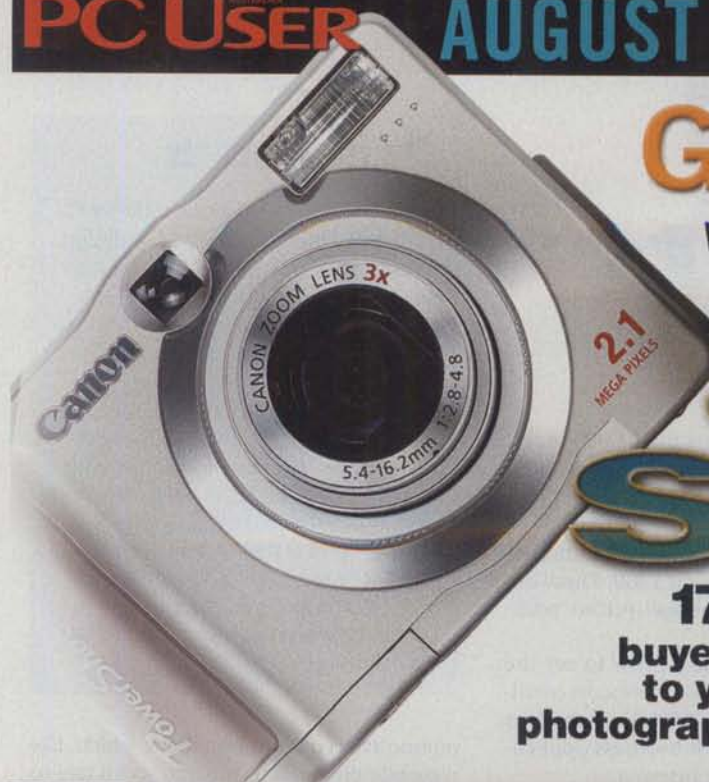
charges, even if they contain a low-power mobile processor. The rated battery life should be taken with a grain of salt.

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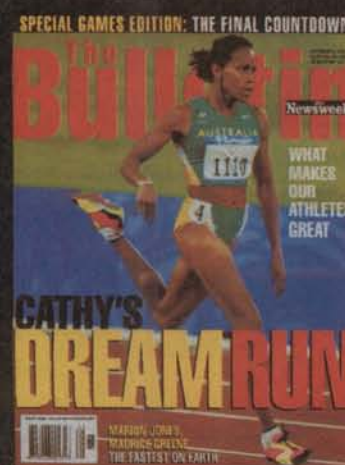
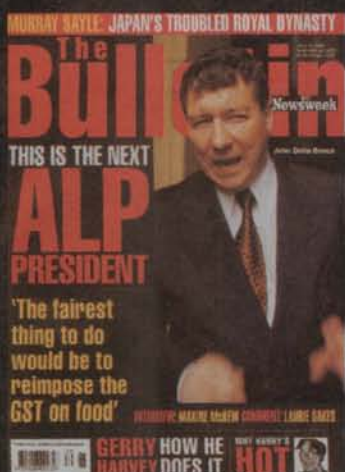
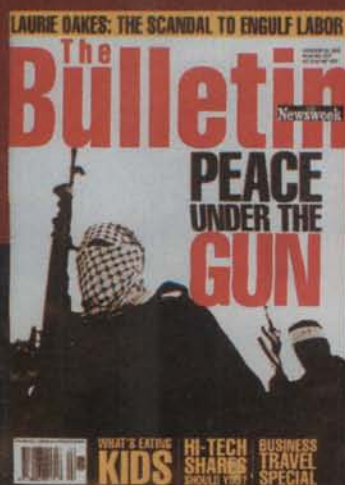
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# *Cut the*





# Cord

*Being 'wired' was once a good thing. Now wireless is all the rage, especially for home and business networks. With connection speeds rising and prices falling, it's time to consider pulling the plug. **Alex Kidman** looks at your options.*

**W**e're all clear about the benefits of networking PCs. However, networking also means tangles of cables that have to find their way through walls and floors so that everything talks to everything else. The cost of laying and routing cables, especially through solid concrete walls, can be alarming. You'd think there would be an easier way. And you'd be right.

After years of development, wireless networking is finally on the rise. It's still a lot more expensive than conventional wired systems — wireless cards start at about \$200, and network access points are \$500 — and experience at APC shows that it requires far more diligence in planning and rollout than conventional networking. However, it's a real winner for growing businesses (especially start-ups) that may need to move several times as they outgrow successive offices. It also allows notebook users to move from meeting to meeting while maintaining a constant network link. Even staff formerly tied to desktop machines can benefit: if you change to a new desk there's no waiting for the support staff to reconfigure your connections or settings.

## Standards and certification

The main wireless networking standards available today work on radio frequencies in the 2.4GHz range, and have a bandwidth of up to 11Mbps. However, you probably won't see 11Mbps streaming through your network for the same reason that your car radio cuts out every time you drive through a tunnel. Radio signals travel well through the air, but their range is limited by walls as well as by distance. Wireless systems attempt to overcome these limits with retransmitters, known as

access points, that also serve as small virtual servers. One of your first tasks when setting up a wireless network is to map out all the radio black spots in your home or office. Most wireless packages help with this by providing onscreen signal details from any position.

The main standard for wireless networking is 802.11b — part of a family of standards set out by the Institute of Electrical and Electronics Engineers (IEEE). It provides for bandwidth up to 11Mbps, but can be stepped down depending on signal strength. It's also backwardly compatible with the older 802.11 standard, which provides a comparatively measly 2Mbps.

An important factor to consider in relation to 802.11b products is WiFi certification. All products using 802.11b should be interoperable, but only those that are WiFi certified have been tested to conform to this standard. Some non-WiFi cards work perfectly with other 802.11b products, but others lose bandwidth or even refuse to communicate at all. WiFi certification means you should be able to jump between manufacturers at will.

Version numbering conventions dictate that numbers should be used in order of increasing value and letters should be used in alphabetical order. Oddly enough, the successor to 802.11b is to be referred to as 802.11a. This wireless technology will work in the 5 to 6GHz range of the radio spectrum. People requiring a medium speed network of up to 11Mbps should stick with 802.11b, but those needing higher speeds should use 802.11a, which is expected to provide up to 54Mbps. No 802.11a products have hit the shelves yet, but here at APC we're drooling in anticipation of all that wire-free raw bandwidth.



## 3Com AirConnect

3Com is one of several manufacturers whose 802.11b products are designed for the home market. Home users demand easy setup, and AirConnect goes a long way towards achieving this.

APC examined 3Com's Starter Pack, which comprises three wireless PC Cards and an access point. The cards are standard, but the access point stands out, and not for the right reasons. Underneath its plastic cover is a very rough metal backplate — very unimpressive.

To set up the access point you need a null modem connection, which 3Com includes in the package. The driver CD includes a HyperTerminal script to assign IP and SSID details to the access point. The options are complex, but the instructions guide you through in simple terms. APC found the PC Card setup slightly tiresome, because although the drivers installed perfectly, the client software refused to recognise that the card was inserted. Multiple reboots and a reinstall of the entire package eventually fixed the problem.

3Com also offers a PCI card solution, which has a PC Card Converter and PC Card, but omits the eject button. This means that the wireless PC Card is the

only thing you'll ever get into the card converter. Installation of the PCI card was virtually identical to that of the PC Card, save for a driver search for the PCI component.

The client software is equipped with the usual configuration options and a very simple but effective method of displaying signal strength — a graded bar intersected by lines going from the adaptor to the access point. You can get more detail from submenus, but this provides all the information you need to assess your network performance.

In APC's tests, AirConnect's performance was acceptable but uninspiring. Streaming from the good position was acceptable, as was file transfer. It took seven minutes and three seconds for the full transfer. Like the D-Link Wireless Networking kit (reviewed on page 111), wireless signal dropped out entirely in the poor position. This could have been overcome with better PC placement or with multiple access points, but the latter is an expense best avoided.



**Contact** 3Com

**Phone** 1800 644 606

**Online** [www.3com.com.au](http://www.3com.com.au)

**Price** Wireless LAN Access Point \$1,990

Wireless LAN PC Card \$398

Wireless LAN PCI Kit \$518

## Somebody's watching me

APC's *Networking Pocketbook* observed that peer-to-peer networking is about as secure as a tent. If not implemented properly, wireless networking is even less secure; the tent has no guy ropes, and there's a force 10 gale on the horizon.

One of the most important security advantages of a standard office network is the physical nature of the network. Presuming there's no Net connection (or that any Net connection is heavily firewalled), there's no way to get onto the network if you don't have a connection point to plug into. In contrast, wireless networking has a range of up to 60 metres and spreads in all directions.

To obtain WiFi certification, a product must be fully compliant with WEP (Wired Equivalency Protocol). WEP is meant to provide the same security as a physical line by encrypting communication between the client and server. However, some studies of the WEP algorithm have revealed weaknesses that could lead to a network that is reliant on WEP, being cracked. WEP was designed to stop

eavesdropping on wireless communication, which is the equivalent to someone listening in on a mobile phone conversation. One of the side effects of this design is an increase in network security, as the relevant addresses and accesses are encrypted along with each network message. There are essentially two approaches to cracking

an 802.11b network: raw decryption of intercepted data; and basic network hijacking. The former is the harder route; some products use a 64-bit algorithm to encode their data, and others use a 128-bit key. Of course, the 128-bit products are more expensive. As with any security feature, you need to determine the value of the information you are protecting.

Network hijacking is much simpler, especially if wireless networks are



incorrectly set up. Wireless access points are always on the lookout for incoming signals, so any 802.11b cards in range can benefit from network access. Yes, that's any 802.11b card within range. Generally, cards must be authenticated to an access point. Within the network, secure details such as the SSID can be configured easily to each client machine, but some studies have

shown that even if WEP is enabled, access points have a tendency to transmit such details unencrypted.

At this stage, parties with a heavy financial investment in 802.11b are downplaying security issues, but some studies have revealed vulnerabilities. No spectacular breaches have come to light as yet, but because the whole point of hacking into systems is to remain unseen, this absence may be misleading.



## Apple AirPort

Apple's AirPort system wins all the wireless style prizes. The cards are invisible once installed, and the main access point looks more like an art deco installation than a piece of technology.

Timid iMac fans who are used to plug and play will have to steel themselves for the unfamiliar procedure of unscrewing the back panel of the monitor, attaching the AirPort antenna to the card and then installing the card. The PowerBook requires that you remove the battery and the keyboard before slipping the card underneath the keyboard. You can't often accuse Apple systems of being harder to install than their Windows equivalents, but in this case, the iBook's lack of a PC Card slot weighs against it.

AirPort supports peer-to-peer networking as well as connection through a base station. Single user peer-to-peer couldn't be easier, and the



excellent help files cater to even the newest of beginners.

Setting up a base station using the supplied base station or one machine as a virtual server is a little trickier. The AirPort setup insists on having a Net connection configured before configuring AirPort networking. For some people this presents no problems, but for others, it's something of a security risk. TCP/IP settings are downloaded to the AirPort base station,

which can then be seen by any device given the correct permissions. It's a good idea to update the installed AirPort software (the current downloadable version at the time of writing was AirPort 1.3) to ensure the best communication possible.

The AirPort's performance lagged behind that of its counterparts. APC's streaming test was fine from the good position, but in the poor position it was all but unwatchable, dropping sound and displaying less than one frame per minute. File transfers from the good position took 10 minutes and 37 seconds, but from the bad position, connection was lost after about four minutes.

**Contact** Apple

**Phone** 13 36 22

**Online** [www.apple.com.au](http://www.apple.com.au)

**Price** Apple AirPort card \$199

Apple AirPort base station \$699

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<http://www.microsoft.com/piracy/howtotell>



## Some light reading.

OBSERVATION: There is no such thing as a 'typical' mobile computer user.

CHALLENGE: Make it easy for everyone planning to move on from their desktop or upgrade their existing machine to find a suitable notebook.

SOLUTION: Offer the widest range of any manufacturer. Divide the range into four model lines. Develop a clear design focus for each.

RESULT:



TECRA: for large corporate users looking for state-of-the-art performance, an advanced feature-set, expandability and the lowest total cost of ownership. Ten models to choose from.

*Tecra 8200 shown: Intel® Pentium® III processor featuring Intel® Speedstep™ technology/1GHz/ultra high resolution 14.1" SXGA+ TFT screen/DVD/CD-Read & Write/fast and secure wireless network access with built-in wireless LAN card and aerial/Optional modular SelectBay and port replicator.*



PORTÉGÉ: for highly mobile individuals looking for full functionality and exceptional reliability in the lightest and thinnest possible package. Four models to choose from.

*Portégé 3490 shown: Intel® Pentium® III processor featuring Intel® SpeedStep™ technology/700 MHz/high resolution 11.3" display/20mm thin/ultra-portable B5 format/1.5kg/elegant and robust magnesium alloy case and chassis/up to 9 hours battery life for all day independence.*



SATELLITE PRO: a general business powerhouse for operators looking for top of the line performance, a full feature-set and expandability at a value price. Ten models to choose from.

*Satellite Pro 4600 shown: Intel® Pentium® III processor featuring Intel® SpeedStep™ technology/900 MHz/huge 30Gb HD/DVD/Brilliant 15" TFT screen/advanced graphics card and sound system/fast and secure wireless network access with built-in wireless LAN card and aerial/optional port replicator.*



SATELLITE: for smaller businesses and home users looking for a full feature-set, solid performance and reliability at a value price. Seven models to choose from.

*Satellite 3000 shown: Intel® Pentium® III processor/850 MHz/14.1" TFT display/modular DVD/best-of-class nVidia GeForce 2 Go graphics/Crystal sound processor/iLink for digital video download/SmartMedia slot for digital camera download/modular SelectBay for swappable CD-RW/HDD/battery.*

CONTACT: To weigh up the options, visit your nearest Toshiba 5-Star reseller (call 1800 021 100 for locations). For more product information visit [www.isd.toshiba.com.au](http://www.isd.toshiba.com.au)

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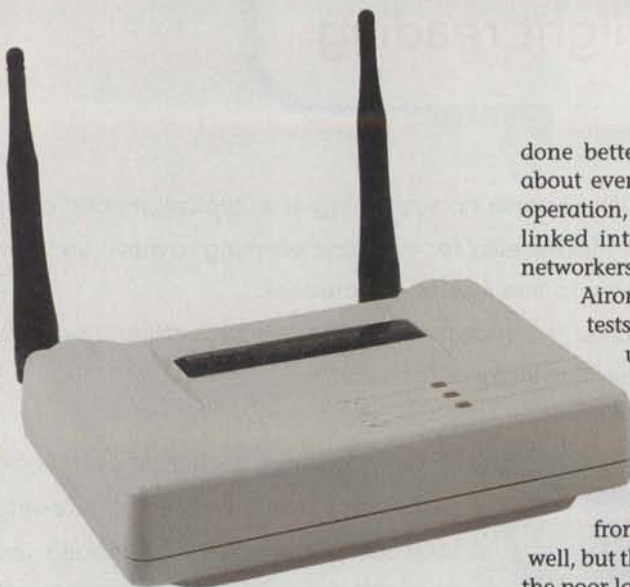
## Cisco Aironet

Like its larger server products, Cisco's setup for wireless networking is a no-nonsense affair that isn't recommended for novices. The instructions lead you through the physical hardware install, but when it comes to software networking, it's a lot less forgiving. In keeping with this no-nonsense style, its cards and access points look like stock-standard PC components. APC found installing its PC Cards simple; a driver CD is provided, but Windows 98, Me and 2000 all picked up Cisco's cards with default drivers.

As internal PC Cards have poor reception, a small dongle hangs off the side of the card to act as an aerial.

Cisco's wireless access points are another story. They can be wall-mounted, and come with screws for this purpose. If you're running a DHCP server to appoint IP addresses, setting up the access point is easy. If you're not, and have to assign IP addresses, the access point can be configured through a terminal. This isn't hard for network gurus, but can be a little daunting for anyone who is new to network configuration.

The supplied Hyperterminal information didn't match APC's communications window, but a little common sense got us



through. Connection to set up the access point can be made through a standard Ethernet cable, or if all else fails, by null modem cable.

Cisco's supplied client software is like its hardware: no frills, but not lacking. From the client side, signal strength can be measured with a series of network pings that are measured in real time on a plotted chart. A full run-down of packet statistics is also available. Once on the network, access points can be configured through a browser. It's here that Cisco could have

done better. The interface displays just about every facet of the current network operation, but does so in a bland, text-linked interface that even experienced networkers may find a little off-putting.

Aironet did very well in our copying tests, transferring files in five minutes and 15 seconds from the good position. This was nearly two minutes faster than its nearest competitor — quite a margin for a networking product. Streaming from the good position was fine as well, but the signal dipped precariously in the poor location, and lasted just six minutes before giving up.

Aironet can't be beaten on speed, so if you're planning to run a lot of clients or you need one dependable connection, this is an excellent choice.

**Contact** Cisco

**Phone** (02) 8448 7100

**Online** [www.cisco.com.au](http://www.cisco.com.au)

**Price** AIR-AP342E2C Access Point \$3,262

AIR-PCM342 PC Card \$625

## Bluetooth — not ready for prime time

If all you want to do is share a few files at very close quarters, the 802.11b standard is overkill. This is where Bluetooth will step in. Created by Ericsson and embraced by mobile phone and handheld companies, the low-power Bluetooth technology is also intended to work on notebooks and create what are being dubbed 'personal area networks'.

Bluetooth has been labelled the 'next big thing' for several years, but it only really started to take off recently. The first generation standard allows for networking over a distance of around 10 metres with a maximum bandwidth of 1Mbps, but this will be doubled to 2Mbps in version 2.0.

Bluetooth sends its data with the same frequency hopping mechanism as 802.11b, switching between 79 different frequencies about 1,600 times per second. Its use of microwave frequencies could make it susceptible to interference from common

microwave ovens. The very low power levels means it's possible to lose the signal through a wall or door.

Part of Bluetooth's appeal is that its low power requirements

mean that it can be built into devices other than PC Cards. It is expected to eventually be incorporated into everything from phones, handhelds and printers to fridges and watches. In theory, there should be no configuration hassles as Bluetooth devices are supposed to discover each other automatically.

The Bluetooth specification allows for three voice channels as well as a data channel, so it's particularly well suited for phones or phone-like devices. The radio frequency used by Bluetooth is available internationally, and as it is low-powered, it's possible it won't interfere with aircraft operation, although the likelihood of interference isn't known at this stage.

APC inserted Toshiba Bluetooth PC Cards into several notebooks and loaded the Spanworks software suite, which is



designed to take advantage of Bluetooth's sharing capacity and provide utilities for sharing network mail and other files.

Installing the cards was a snap. The software created a new desktop icon for the Bluetooth Neighborhood.

At this point, the Bluetooth products should have been able to recognise each other when brought close enough together. No such luck. They only began to talk to each other when the search for nearby machines was forcibly refreshed on both systems simultaneously.

APC was surprised to find that the signal was erratic, and often dropped out altogether. One of the supposed benefits of Bluetooth is cheaper networking prices, but early adopters are likely to incur higher prices than those who stick to many of the 802.11b options examined in this review.

**Contact** Toshiba

**Phone** (02) 9887 6000

**Online** [www.toshiba.com.au](http://www.toshiba.com.au)

**Price** \$269



## D-Link Wireless Networking

D-Link promotes itself as very user-friendly and easy to set up. It targets the home market, and pictures of fathers and sons, mothers and babies abound on the packaging. Despite this, the manuals supplied are written in a very dry, technical style which is likely to bewilder that audience. Fortunately, help guides that are much simpler to comprehend are provided on the installation CDs. These guide you through setting up a peer-to-peer or access point-based network.

D-Link's networking package comprises two PC Cards and an access point, as well as separate packages with USB connectors and PCI cards. Like others of its type, the PCI card is a PC Card adaptor bundled with a wireless PC Card. APC found this more than a little tricky to

install, as the PC Card slot on the card was very stiff and resisted having the wireless card inserted into it. Likewise, we were concerned about the power supply cable for the access point, which sat loosely in the power socket. Access points aren't moved much, but one bump could see a section of your network suddenly vanish — not a good thing.

D-Link's connection software is rather like its printed documentation — efficient, but not terribly inviting. Again, the HTML help can guide you through installing your network without too many worries.

D-Link performed quite well in APC's tests. It streamed video without a blemish. For file copying, it managed a second-best six minutes and 52 seconds from the good position.

However, performance became markedly worse from the poor loca-



tion — no signal was received at all. This suggests that D-Link has an antenna with a great close signal but a relatively poor range. This can be overcome using multiple antennas, if you don't mind the expense. Multiple antennas are a good idea for blanket coverage, but you're better served by an antenna that already has a good range.

**Contact** D-Link

**Phone** 1800 177 100

**Online** [www.dlink.com.au](http://www.dlink.com.au)

**Price** DWL 905 Laptop Wireless Kit \$1,953.60

DWL 120 USB wireless adaptor \$502

DWL-500 PC Card \$585

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## Lucent Orinoco/Compaq Wireless LAN

Lucent is one of the leading names in wireless networking — so much so that its products are rebadged by many companies. For example, Compaq's entire Wireless LAN range is made up of rebranded Lucent Orinoco products.

APC took a look at both ranges, and found that everything from the software to the wording of the product manuals is identical — not a bad thing, as APC was very impressed with the supplied documentation. Aside from the obvious installation instructions, it also offers potential schematics for peer-to-peer and access point setups. Using this documentation, it would certainly be hard to go very wrong. However, the manuals note that you need some networking knowledge to fully realise the potential of the hardware.

The Orinoco range has PC Cards, PCI cards and a USB connection point for



the client side, as well as access points and residential gateways to handle the server side of the equation. Installation of all of these was easy. The client-side setup for USB and PC Cards is especially good, and it allows you to create up to four different connection styles. This means you can swap from a simple peer-to-peer network to a gateway connection with a few simple mouse clicks.

In APC's close range test, Orinoco was stable but slow, streaming video smoothly and copying the test files in eight minutes and one second. Like other systems, it struggled with the poor position. However, the software provided a warning that dropouts were likely and suggested that the access point or system be moved into a better position. It managed just over eight minutes of copying before it dropped out. To resolve this problem, you could go for another access point, or

there's an antenna extender available from Lucent.

The Compaq clones work out cheaper than the Lucent systems, units generally priced \$30 to \$50 cheaper than their officially branded counterparts. Lucent has the advantage of offering a broader range of options (including some cards with 128-bit encryption).

### Contact Compaq

**Phone** 1300 301 234

**Online** [www.compaq.com.au](http://www.compaq.com.au)

**Price** WL210 PCI card \$395

WL110 PC Card \$295

WL410 Access Point \$1,395

WL310 Gateway \$795

WL 215 USB \$345

### Contact Integrity Data Systems

**Phone** (08) 8351 1900

**Online** [www.integritydata.com.au](http://www.integritydata.com.au)

**Price** Lucent AP-500 Access Point \$1,912

Lucent USB Client \$469

Lucent Residential Gateway \$799

Lucent PC Card \$325



## Notebooks ready to roam

PC Cards provide an instant wireless solution for almost every notebook on the market, but most of the major players are now building 802.11 into their flagship products. APC tested three notebooks with built-in wireless networking: two from Toshiba and one from Dell. Both brands use Lucent's Orinoco Mini PCI card.

Wireless networking with these notebooks has two advantages. First, the antenna on all three models is embedded in the notebook lid, so it provides superior range compared with the tiny stub aeriels that come with PC Cards. Second, the PC Card slot is kept free for other devices.

All three notebooks passed APC's tests with flying colours, transferring files in seven minutes and 25

### Contact Toshiba

**Phone** (02) 9887 6000

**Online** [www.toshiba.com.au](http://www.toshiba.com.au)

**Price** Tecra 8200 \$10,631

Satellite Pro 4600 \$5,263



seconds from the good position, and streaming well. Even in the poor position the notebooks outdid the PC Card-based machines.

Not all 802.11 notebooks have this edge, because the physical location of the antenna varies. If the aerial is embedded in the base of the unit

rather than the lid, diminished range is likely because of the loss of height.

Another aspect of the notebooks APC examined was peer-to-peer networking (which can be achieved with any of the PC Card solutions as well). The client software that comes with the notebooks (from Orinoco again) makes setting up peer-to-peer

exceptionally easy — just designate a network name, make sure both machines adhere to it and you can share resources at will. This proved faster than any of our access point-based tests, but that's to be expected because direct communication makes lost signals unlikely. Of course, unless you want to make one machine a server, you can't assign IP details or manage complex network functions, but it's excellent for impromptu file sharing.

### Contact Dell

**Phone** 1800 812 393

**Online** [www.dell.com.au](http://www.dell.com.au)

**Price** Latitude C600 \$3,599

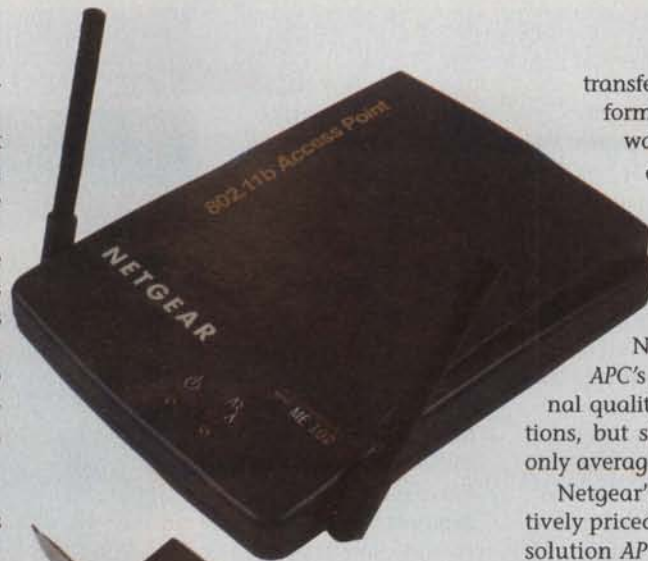


## Netgear

Netgear's equipment for wireless networking includes the usual access points, PC Cards and PC Card adaptors, but most of these components come with a twist. The first, and most basic difference can be found in the PC Card adaptor, which is *only* an adaptor. If you purchase one of these, you need to buy a wireless PC Card as well. The access point isn't as stylish as Apple's AirPort base station, but has a feature no-one else seems to have thought of — the ease of USB connectivity. The adaptor looks rather like a small TV antenna.

Netgear is easy to use in other ways. For example, you don't have to mess around with Hyperterminal and its ilk, as Netgear provides a configuration utility that quickly gets you up to speed with current settings, and enables changes to be made. PC Card setup is similarly straightforward. Simple dialogs are used all the way.

Despite Netgear's focus on ease of use, the supplied documentation is rather inadequate. A fold-out



sheet for each product (containing only the simplest details) is all that's provided. This doesn't give you a lot of printed reference to fall back on if things go wrong.

The unit's performance in APC's testing was fair. It managed good quality streaming, but a decidedly average seven minutes and 28 seconds for file

transfer from the good location. Performance from the poor location was more impressive. As with the other products reviewed, network quality wasn't nearly as good as streaming and the copying test dropped out eventually, but it did last about 15 minutes, making Netgear the leading product in

APC's poor position testing. The signal quality is good even in poor conditions, but signal strength appears to be only average.

Netgear's products are very competitively priced. It has the cheapest PCI card solution APC came across, but it doesn't come with a PC Card.

The unit's strength is its solid but unspectacular performance.

**Contact** Netgear  
**Phone** 1800 502 061  
**Online** [www.netgear.com](http://www.netgear.com)  
**Price** ME102 Access Point \$799  
 MA301 PCI card \$129  
 MA401 PC Card \$399

## Xircom wireless Ethernet adaptor

If you already have a wireless network in place, there's no reason you should stick to one manufacturer when choosing new equipment. For example, Xircom has a wireless 802.11b Ethernet adaptor that plugs into any 802.11 network. APC put it to the test in a mixed group including a Compaq USB card and a group of Cisco Aironet access points, run across two notebooks and a desktop system.

Driver setup for the Xircom card was easy, but very little in the way of instructions is provided for installing the client. Xircom uses the same software for its client utility as Cisco, which means that the same dialogs and reporting options are employed. The test results for the Xircom card were consequently the same as those for the Cisco software reviewed on page 110. All that's changed are the program icons.

The Xircom's performance was mixed. Its download time from the good location was five minutes and 21 seconds, which is only a touch slower than the Cisco products. Streaming from the close position was also fine. From the poor loca-

tion, streaming was, as expected, appalling, but the card managed crisper still images than most cards. APC was particularly impressed with the card's robustness in copying files from the bad location. The signal eventually dropped out, but only after about 10 minutes. Signal quality remained at least fair during this period. This indicates that the antenna on the Xircom card worked particularly well within our test environment, and that the card is a good choice in an environment where radio signals are weak.

At \$199, the Xircom is the least expensive card in this review. Combined with its compatibility with other products, this makes it a great option for establishing — or integrating into — any wireless network.



**Contact** Xircom  
**Phone** (02) 8923 7000  
**Online** [www.xircom.com](http://www.xircom.com)  
**Price** \$199

## Wireless gaming

APC had a go at setting up a LAN games network using only 802.11b products. Why face a mess of cables and hubs when you can set up your PC within range of an access point and get going?

Every system APC used implemented a different product. The desktop system used a Compaq USB adaptor and the notebook had a Xircom PC Card, connected through a Netgear access point. It was all WiFi certified, so we knew it should all communicate well — and it did, up to a point.

The test game was Raven Software's *Soldier of Fortune*, which we ran in the same test locations as the regular trials. Near the access point, performance was as good as it would be if we were connected to a regular network, with exceptionally low pings and great response times. From the bad position, performance was worse for the notebook player, who had to endure terminal lag.

802.11b is fantastic for gaming, as long as the range isn't too taxing. Dedicated access points that boost the signal could be a good investment.



## HomeRF

Bluetooth and 802.11 aren't the only wireless technologies around. HomeRF was designed for the home and SOHO market, and features low bandwidth (starting at 2Mbps) and affordability. Admittedly, it has fallen out of favour — mainly because Intel dropped out of the development process in favour of 802.11b — but it can be useful for home users if you can find the apparatus at the right price. Diamond used to market HomeRF solutions through its HomeFree brand, but now uses that brand to deliver networking through home phone lines. This product is yet to hit the Australian market, and considering how nervous the local telecommunication bodies are, it may never do so.

Several companies, including Motorola and Compaq, are working on HomeRF 2.0, which promises to boost data speeds to a meaty 10Mbps. The main reason HomeRF is worth a look is that it is designed for the consumer market, not the professional

market. Speeds are a touch slower, but prices are considerably lower. This can be very appealing if all you want to do is share a few files or play network games.

HomeRF used to trade heavily on its ease of setup compared with conventional Ethernet networks. However, 802.11b networks have been making a lot of progress in this area recently. Integration with phone services is also improving. The newer HomeRF 2.0 specification supports running up to eight phone line streams concurrently, with a single data stream sent across its bandwidth. This places it ahead of technologies such as Bluetooth — at



least for the time being. Phone calls using HomeRF have only been performed under lab conditions so far, and the plan is to release phone units to the US market sometime later in the year. This could mean a long wait before any of these products are released in Australia.

Its advocates still push HomeRF as better than 802.11b, and vice versa. In Australia,

802.11b products are easier to locate, which suggests that the local market for HomeRF has declined. Competing technologies often leave consumers stranded, but they can also lead to lower prices across the entire market.

## How we tested

APC evaluated wireless networking products according to two criteria. First, we wanted to see how difficult setup of individual products was. This evaluation included comparisons of written manuals and setup instructions, and physical factors, especially as they relate to access points. APC looked at a range of access points, some of which could be mounted on walls or poles (to increase radio range). Others were designed according to aesthetic principles.

The second testing objective was to evaluate the capabilities of the wireless networks that were set up. Unlike a cable-based network, wireless networks are highly susceptible to environmental factors. A metal door in the wrong place can create radio blackspots, as can simple items like microwave ovens.

APC tested the quality of wireless transmissions from two areas in our offices. We designated a 'good' position, which was about three metres from the access point, and a 'poor' position in the far corner of the floor, where signal strength was at its weakest. The good position gave us an indication of peak network rates, and the poor position was used for two reasons: to indicate what conditions would be like in a position with poor radio reception; and

to degrade the signal strength as would happen on a busy network. In other words, we wanted to simulate a network under pressure.

The first test checked the overall robustness of the network by streaming a 20M QuickTime file from one PC to another through an access point. Wireless networking isn't very well suited to the high bandwidth requirements of streaming video, so video is good for spotting flaws in bandwidth consistency.

The second test was a file transfer of 117M of files from one system to another through an access point. In the good position, this gave a good indication of the total bandwidth available — an important consideration for any system that is expected to share across a large number of client machines. Transferring from the poor position provided information on how well (and for how long) individual components can handle a very bad signal, how they track a bad signal and whether any warning is given prior to copying or prior to dropping out.

The tests were designed to stress the system. There are plenty of things that could have been done to improve conditions, including using the supplied utilities to test signal strength and then installing additional access points, or moving machines into better positions.



## Cisco Wireless Networking

Highly recommended  
Lucent Orinoco

APC examined a wide range of products for this review, so choosing the best was particularly hard. What's perfect for the corporate market is rarely best for the home user, and vice versa. Nevertheless, it's hard to beat the quick transfer times the Cisco wireless products offer. The antenna extenders and higher security network points provided by Lucent's Orinoco solution are also very appealing.





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## Corporate briefs

### Everyone wins in database wars

When research firm Gartner released its annual figures on database market share, both Oracle and Microsoft had cause to celebrate. Long-time champ Oracle retains the number one spot, holding 33.8% of the \$US8.8 billion global database market and dominating the relational database category, which accounts for 80% of total sales, with a 42.1% share. However, Microsoft was quick to crow over the fact that it had the top position in Windows NT-based databases, with a 38% market share. In that market, Oracle had to be content with coming a close second, with 37%. By this time next year, both Oracle and Microsoft are expected to have released upgrades, which will make the figures more interesting.

### New boss old boss at Citrix

After almost a year, server-centric computing developer Citrix has filled its vacant CEO position — with the man who originally left the job. Mark Templeton, who served as president during the 12-month hunt for a chief executive to lead the thin client pioneer, has now resumed the post, while acting chief operating officer Roger Roberts will return to being simply a board member. In March, Citrix purchased portal developer Sequoia Software.

### CorProcure loses its head

CorProcure, the year-old, high-profile online procurement service set up by 14 of Australia's largest companies, isn't finding the going too easy at present. CEO Len Hodge and eight other staff members departed the venture in June, amid reports that some CorProcure founding members (the line-up includes Amcor, ANZ, Australia Post, BHP, Coca-Cola Amatil, Coles Myer, Foster's, Goodman Fielder, Orica, Pacific Dunlop, Qantas, Telstra and Wesfarmers) were considering pulling out. As Corporate IT reported last month, many corporations are claiming a recognised brand name is more important than lower prices in business-to-business transactions.

## Sewerage documents online

A major integration project has improved Sydney Water's delivery of critical documents to its customers through a pair of online interfaces rolled out on the Internet and through a network of retailers.

The new system builds upon several existing information systems, which contain a wealth of data, including sewerage layout, drainage, water services, and customer and property information relating to nearly 1.3 million Sydney properties. Documents include rating certificates, service location plots, building over sewer applications and sewerage service diagrams (SSDs), which are required for everyday land conveyancing activities.

Over six months, Sydney Water implemented two new applications that pull data from existing systems and use Web technologies to deliver the information to the interested parties.

Property Link, one of the two new systems, allows information brokers — used by conveyancers to hunt down documents pertaining to land transfers — to retrieve SSDs online instead of having to lodge conventional paper requests.



To improve builders' and plumbers' access to planning documents, Sydney Water also worked with Reece, TradeLink and Cooks to set up the companion Quick Check service at 18 Sydney plumbing retailers. In the past, builders had to go to Sydney Water headquarters or suburban customer centres to view relevant diagrams, but Quick Check allows them to obtain documents over the counter.

Quick Check and Property Link have extended the hours during which builders and conveyancers can retrieve documents, improving customer service and easing the administrative burden on Sydney Water staff. Previously, the company processed more than 335,000 document requests every year.

"We wanted to set up this online process so we could deliver to our customers without them having to come to us all the time," said Mark Gambetta (pictured), IT coordinator for Sydney Water's Customer Services Division. "These services are helping us drive down our costs, and at the same time are improving our customer satisfaction and ease of access."

David Braue

## This month's buzzword: WASP

### Why do we need this word?

The notion of application service providers (ASPs) is still in its relative infancy, but eager moves into the market by companies keen to profit from the expected ASP gold rush makes it difficult to tell one from the other. One solution to this problem is to come up with new sub-categories of ASPs, where competition may seem to be less. Hence the emergence of WASP.

### What does it mean?

WASP stands for wireless application service provider. While the cynical and opportunistic might see this as encompassing such basic and existing applications as text messaging between phones, it is generally understood to cover access to more substantial business applications by means of a mobile phone or other wireless device.

WASPs may provide a standalone service, or add new functions to existing ASP systems. An associated acronym is

wireless application infrastructure provider (WAIP) — a company which provides bridging solutions between existing applications and wireless network providers.

Research firm Ovum estimates that more than a billion people will be using WASP services by 2007, which translates into half of all mobile phone owners. However, you may want to get in quickly if you're planning on making money in this field: consultancy Strategy Analytics has predicted that just five or six companies will control 75% of WASP revenue by 2005, and Ovum estimates enterprise revenues from WASP one year after that will be about \$US12.6 billion.

### Where should I use it?

When discussing your corporate plans to embrace the ongoing wireless revolution. A useful sample: "We should explore the potential of WASPs to provide better connectivity to our on-the-road staff."





# Lean times for Linux

**C**ommercial Linux developers are being squeezed by ongoing uncertainty in the technology sector. A number of prominent Linux businesses have announced major changes in recent months, bringing into question the long-term future of businesses based around the popular open source OS.

One prominent recent casualty is Eazel, which aimed to develop friendlier interfaces for Linux (widely perceived as one of the key weaknesses of the OS). The Eazel team included staff associated with the development of the original Mac OS. "Unfortunately, the high-tech capital markets have all but dried up and we have been unable to secure funding," cofounder Bart Decrem wrote in a message to the Linux community announcing the closure in May.

Corel, which had similar dreams of making Linux easier for the masses, announced in January that it was planning to spin off its Linux business and concentrate on its core productivity tools (including Linux tools in those areas). However, it has yet to announce a buyer for the division — possibly another sign that Linux-based business models may be running out of steam.

Even attempts to merge Linux businesses and gain profitability from scale are running into roadblocks. A planned merger between supercomputer developer Linux NetworX and Linux reseller Ebiz was called off in May. Just days before, Linux service company Linuxcare and software developer Turbolinux called off a merger which had been announced in February. The two companies, which had operated as a single entity for just three months, could not agree on an overall future direction. During the merger period, Australian Linux guru Andrew Tridgell, one of the key developers for Samba, a popular Windows networking system for Linux, jumped ship, moving from Linuxcare to VA Linux.

Even more visibly successful Linux companies are also facing turmoil. Mandrakesoft, which develops the popular

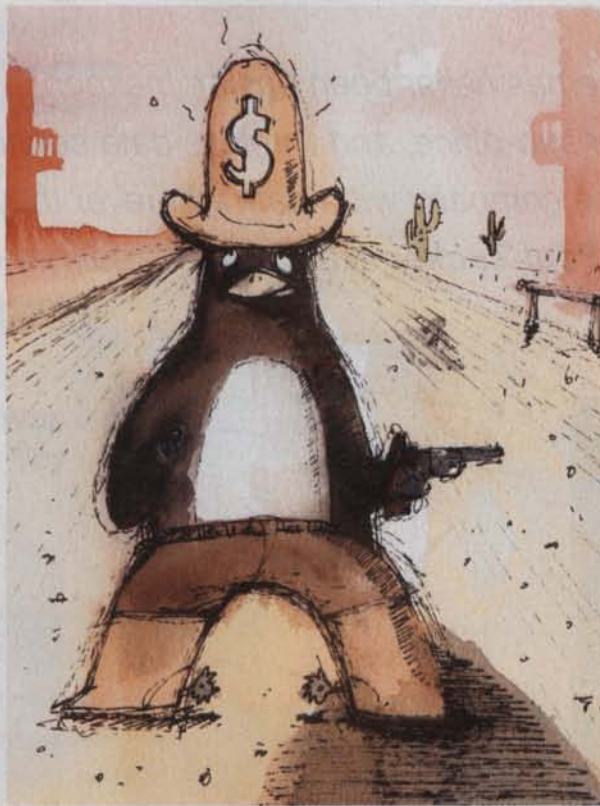


Illustration by Warren Taylor

Mandrake Linux distribution, saw its CEO, Henri Poole, depart in May after a disagreement over future directions. Caldera laid off 17% of its employees in late April. In addition, VA Linux, one of the first Linux companies to launch an IPO, is continuing to burn through cash, posting a \$US19 million pro forma net loss in its most recent quarter. The only company which appears to be sailing along largely unchallenged is Red Hat, which produces the most popular commercial Linux distribution.

## Still hot on servers

Despite corporate woes, interest in Linux remains strong on the server side. A study released in April by IDC predicts that paid Linux licences in the Asia-Pacific area will exhibit a compound annual growth rate of 53% over the next three years, rising from the current 86,000 to 700,000 by 2004.

IDC estimates that more than 2 million total licences for Linux have been deployed in the region, showing that, on the whole, Linux users aren't paying for the product. In a disturbing note for independent Linux developers such as Caldera and Corel, the most popular distributions after Red Hat come from con-

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## Patch Panel

The Patch Panel section on CD 1 of APC's cover CD pack includes the latest patches and updates for a wide range of operating systems and applications.

ventional Unix developers such as Hewlett-Packard and IBM.

Many analysts remain bullish on Linux's future prospects, but few see it making any inroads outside the server market. Predicting that it would comprise 10% of OS server shipments in 2001, a recent Gartner report noted: "Linux is being deployed in a number of application situations, but it is most prevalent in external Web, internal Web and infrastructure server situations."

There is at least one other silver lining among the clouds of doom for Linux enthusiasts. The source code for most Linux products must be made freely available as part of open source licensing conditions, so individual enthusiasts can continue to develop those products, even if the companies that created them go under.

Recent changes to Microsoft's licensing model for corporations, moving towards a more subscription-centric model, might also see a boost in Linux's market share. Part of the system's appeal has always been that it provides an alternative to the Redmond behemoth. However, the man responsible for creating Linux says he can't understand the anti-Microsoft bias of many Linux supporters.

"I think it is strange how much people don't like Bill Gates," Linus Torvalds commented in a recent interview. Torvalds added that he doubted subscription plans for applications would prove popular.

Angus Kidman



# Does teleworking really work?

Working away from the office has never been easier. Inexpensive broadband can be delivered to the home or sub-office, and wireless data services allow mobile workers to take the rest of the company with them wherever they go. But how well does it work in practice? **Paul Zucker** examines the realities of teleworking.



Illustration by Warren Taylor

**T**his view of teleworking reflects what many people still believe: 'In America they call it teleworking. In Australia it's still pretty well known as bludging'. In other words, a teleworker is someone who should be working in an office, but has somehow wangled a computer out of the boss and gets to 'work' from home.

The concept of teleworking is about as old as the PC and modem, going back more than 20 years. It should be easy to define, but there are a few different situations that attract the 'teleworking' label, each of them valid. They all share the concept of working away from the regular workplace while maintaining contact using technology.

The *Concise Oxford Dictionary*, for instance, states that teleworking is the same thing as telecommuting, which it defines as "working from home, communicating by phone, telex, modem, etc". Despite that definition, there are important differences between the two terms. Telecommuting suggests working away from what would normally be considered the workplace, usually in a fixed location such as the home. In other words, the employee commutes by electronic means. Teleworking is a broader term which also covers any work done away from the office, in a mobile or relocatable sense.

Perhaps as a result of this confusion, there are not many accurate statistics on

the teleworking phenomenon. A study by the Australian Bureau of Statistics found that almost one million Australians work from home, but that number included self-employed people. Of people working at home, 64% regularly used IT as part of their jobs.

A recent IDC survey of Australian businesses with 50 to 99 employees found that almost half of those businesses allowed remote IT access to their workers. The level of remote access was highest in the banking/finance and telecommunication sectors — industries where employees are becoming more mobile. In addition, a significant minority of small businesses are allowing



remote access to their LAN (Local Area Network) by authorised people outside their organisation.

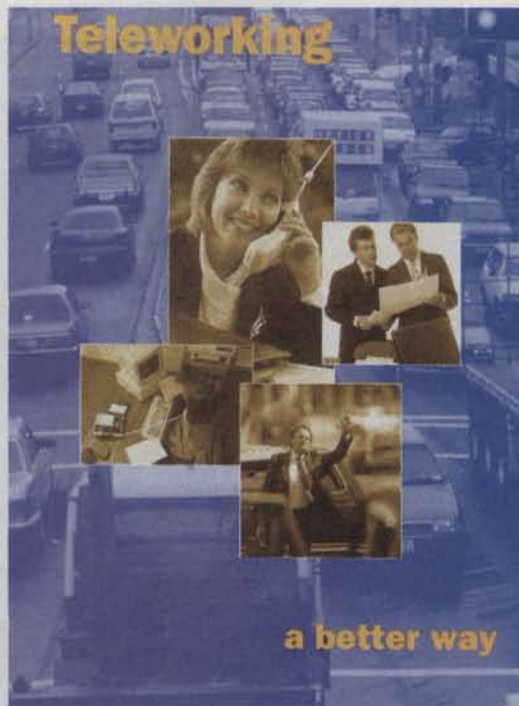
That trend doesn't appear to be slowing down. "Teleworking is one of many flexible work options that employers can offer to assist their employees in managing their work and personal life commitments," said Rachel Wynd, of the Work and Family Unit at the Federal Department of Employment, Workplace Relations and Small Business. "Teleworking arrangements are a common feature in organisations that employ best practice in work and family. Teleworking equally suits both small and large businesses."

## Paying the price

One aspect of teleworking that is often forgotten is the overall social cost. This was brought to Australia's attention last year during the Olympic Games. Apart from individual business benefits, teleworking results in reduced fuel use and lessens the need for transportation infrastructure. The Olympic Roads and Traffic Authority (ORTA) actively promoted teleworking for businesses throughout the Sydney area during the Games. ORTA even placed some of its own employees in one of Sydney's new teleworking centres — the Roads and Traffic Authority centre at Penrith.

The NSW Roads and Traffic Authority (RTA) has been an innovator in teleworking since the early 1990s, producing a number of reports and hosting some excellent online resources on its Web site. In 1997, it decided to build a telecentre at West Gosford, a satellite feeder area an hour and a half north of Sydney's CBD. For the trial, 20 staff from various Sydney and Newcastle offices were chosen and could work both at home and in the telecentre, which provided a range of office facilities. Following the success of the trial, the centre was made permanent, and a second telecentre was built at Penrith in Sydney's west.

The centres use hotdesking (desk space which can be used by any visiting employee) to maximise the use of the desks, as workers usually spend one or two days there and the rest of their time at their usual offices. The centres are connected by 64Kbps ISDN lines to the RTA's wide area network backbone in Sydney, and have their own LAN. The PCs (note that not all desks have PCs) are typical office systems. However, each PC also has a 100M Zip drive to allow for the transfer of large amounts of data, avoid overloading the ISDN line and allow workers to transfer their own work in



▲ The NSW RTA is very generous with sharing its teleworking experience.

progress. The PCs also have terminal emulation software, which allows employees to log in remotely to various RTA back-end systems. Each desk has a direct exchange phone line with full privileges, including call diversion.

## Requirements, restrictions and rewards

As the RTA example shows, operating a teleworking culture in a corporate or government situation is slightly more complicated than giving people modems and showing them the door. Over the past two decades, we've collectively learned a lot of tricks. A quick trawl of the Internet reveals hundreds of Australian hits: case studies, white papers, commercial products, unions, tip sheets and government initiatives. It also reveals that teleworking has not been a universal success, with many experiments failing, or at least being scaled back.

For an employer to offer teleworking to employees, there are three main areas of involvement: the IT department, the human resources department, and the department manager.

The IT department has to provide the infrastructure for teleworking to operate, and to some IT managers, that is the same thing as cutting a hole in their side and leaving it exposed to all the bacteria the outside world can deliver. A reluctant IT manager will point out that it is hard

enough to maintain the security of the computer system under normal circumstances; how can they be expected to guard their data and systems safely if they are forced not only to expose it to the outside world, but also to invite outsiders to extend electronic fingers into the system?

The HR department has simpler but still important considerations. Apart from the obvious one of ensuring that people are earning the money that they are being paid, there are extensions to the normal questions of the company's legal liability, insurance and adherence to statutory regulations. Are they entitled or even obliged to conduct workplace inspections or are they best advised not even to think about such things? There is no Australian legislation governing teleworking, but the employer still has to be aware of occupational health and safety and workers' compensation requirements.

In the best of worlds, the department manager would only have to ensure that the work was being done properly and that the employee was happy with the arrangement. Unfortunately, as many managers have found, there is often deep resentment from office-based employees, who suspect that their teleworking colleagues are on some sort of paid holiday.

## Advantages and disadvantages

For the employee, teleworking can be a liberating experience, but it can also turn into a type of prison sentence. The home-based teleworker still has to perform a certain amount of work, or achieve certain targets, but misses out on the social contact that an office job provides. For some, this is offset by not having to waste time on lengthy travel or having to get dressed for work.

There are advantages and disadvantages to teleworking, both for the employer and employee, but experts agree that the benefits, such as higher job satisfaction and greater productivity, usually outweigh the problems. Cost can be a factor, but studies show that the savings to the employer are approximately balanced by the added costs of establishing and maintaining the home equipment. Employees say that their costs are reduced, as travel, clothing and food expenses are all reduced.

Studies have shown significantly reduced employee turnover among those who telework. Sick leave is also lower, partly because it is obviated by working



from home, but also because employees report contracting far fewer 'public' illnesses, such as colds and flu. Other employees find that teleworking allows them to take a much shorter maternity leave period.

It has also been found to be of value in allowing employees with injuries to recommence work much sooner than they otherwise would. Some employers are also taking on handicapped people who are able to do the job perfectly well, but do not feel comfortable working in a public office.

Naturally, there are downsides to teleworking. Not everyone has the space to dedicate to a home office, or can shield themselves sufficiently from the general hubbub at home. Anecdotal, up to a quarter of people who have a go at teleworking from home give it up in the first few weeks.

## Resources

There are many excellent resources for companies that want to establish a teleworking program. These range from state and federal government departments, to teleworking associations, to third-party studies and reports. However, the best sources of information are often other employers who have already put a program in place.

In many cases, they are willing to share some or all of their experiences, as well as valuable information such as employee manuals and details of the changes they have had to make to practices such as insurance and human resources facilities. In addition, you may be able to learn about provisions you have not anticipated, such as dispute resolution.

The Department of Employment, Workplace Relations and Small Business (DEWRSB) has some excellent resources. These include the Work and Family Resources Kit and its numerous components, which can be purchased separately. The DEWRSB site ([www.dewrsb.gov.au/workplacerelements](http://www.dewrsb.gov.au/workplacerelements)) also lists some Australian employers with successful teleworking schemes.

However companies put it into practice, it seems clear that teleworking is here to stay. "As companies place more emphasis on attracting and retaining the most qualified employees, the Nintendo generation will question why they are driving for over an hour to get to work when technology makes the information available to them, at their fingertips, wherever they are," said telecommunications analyst Paul Budde.

## It's a small world for telecommuters

Rob Small's employer, Dell Computer, has its main Australian office in the Sydney suburb of Frenchs Forest. He lives in Mosman, about half an hour's drive away (if the traffic's with you). Thus it is no surprise that Small, the company's communications director, is a dedicated telecommuter.

Dell has a policy of encouraging employees to spend some of their week working from home, if it suits their job. This isn't an option for some positions (such as call centre operators), but it is possible for Dell's 'desk jockeys', from senior management down, and is especially encouraged in field sales positions.

As Small explained to APC, the policy is meant to improve employees' quality of life, certainly not to constrain them. "This is a very forward-thinking company, and working from home is completely optional, but of those of us who do it, most have found all sorts of advantages, such as reduced stress levels and increased productivity."

A typical employee in the Sydney office works from home two days per week. Small noted that some Dell employees work from home because they have young children, "and others work five days per week at the office for exactly the same reason!"

Dell picks up the tab for basic equipment in the home office, including a dedicated phone line and a company-supplied notebook PC. Small currently connects to the office network through a second phone line and 56K modem, but he hopes to be upgraded to a broadband connection by ADSL or cable Internet soon. "For most of the things I do, a dialup connection is fine, but it will be nice to have a connection which is virtually as fast as being in the office," he said.

Dell imposes a number of rules on home workers, including a requirement that they set up a dedicated workspace in a 'professional' manner. (Small uses a third-floor attic space as his office.) Each office has to have standard equipment, including a fire extinguisher and a first aid kit, and must comply with occupational health and safety requirements in the relevant areas, such as lighting levels and fresh air. The company also pays an

allowance to cover expenses such as power, insurance and office consumables.

Dell Australia does not use any special remote access software, but has installed a remote access concentrator to ensure that all teleworking employees can hook up easily. As well as traditional office applications, various departments use software, developed inhouse and based on Oracle Financials, for quotations and order management used by the sales team.

Dell's sales force is even more dedicated to teleworking; indeed, its members spend so much time working from the road that they don't even have desks at work to call their own. Instead, they 'hotdesk' and store their possessions in lockers. For these staff, their remote office is just as likely to be in a hotel, an airport lounge or their car as at home.

In general, employees are expected to treat their time working from home much as they would at work. "If you're working from home, you have to be available," Small said. Normal HR rules apply in areas such as taking sick leave.

One of Dell's other rules for teleworking is 'No meetings at home', but Small said that far from being a hindrance, this fits in well with his work. "I deal with a lot of our agencies in nearby North Sydney, so I usually schedule those meetings for the days I work from home. And if I need to meet someone who's coming to me, I have a favourite nearby café I use all the time for meetings."

Small says he saves at least one hour every day in travelling to and from the office, and having to plan what he will be doing each day has made him a more organised person. He also values the flexibility that working from home affords. "It's easier to schedule the things I want to do, such as being able to go to the gym at a civilised hour instead of going there in the dark on the way to work."

Small also sees other advantages to working from home. "I get to dress down a little, such as wearing shorts and bare feet in summer. And then there's the cappuccino machine in the kitchen!"





# Smart thinking

*Classic business intelligence applications appear to be enjoying a resurgence as corporations have begun to realise that they need to analyse the wealth of information provided by online commerce. **Angus Kidman** checks out the newest trends in data analysis.*

**T**here aren't many tasks more tedious than poring over a spreadsheet loaded with financial data. However, if there's a lesson to be learnt from the past 18 months of dot com disasters, it's that managers need to be aware of what's going on in their companies sooner rather than later.

This is where business intelligence (BI) software comes in. BI programs churn through large chunks of financial information — everything from sales data to employee timesheets and profit and loss statements — and identify trends, presenting them in graphical format.

On the surface, the information they present often looks like a conventional spreadsheet with a few charts sprinkled around. The main advantage of BI packages is that they allow you to drill down into the information. Not sure why sales are looking low? Double-click the sales column to find out which components make up those sales. Areas performing below expectations can be readily identified, and drilled into further to identify problems such as excessive costs or regional variations in supply. Of course, the software only identifies problems; solving them is up to you.

Once the preserve of senior management (indeed, the category was known for a time as EIS — executive information systems), business intelligence tools are now reaching a wider base of users. "That's probably the biggest change in business intelligence," Matthew Lingard, managing director of local BI consultancy ZapTech, said.

ZapTech develops its own tools and resells Cognos and other products. "In the old days, you'd deploy to 10 or 20 analysts. Now it's available to many more people. Instead of taking it to 5% of the organisation, you're taking it to 30 or 40%." According to Lingard, "everyone will eventually have access to this information on their desktop". However, the depth of information that can be accessed will vary depending on job roles.

Like many corporate technologies, BI often takes root in one department before



spreading further afield. "People are moving away from the departmental approach and taking an enterprise-wide view. It was a bit of an unknown earlier on," Paul Beks, Asia-Pacific regional director for BI software developer Brio Technology, said.

That shift reflects a move away from the classic top-down management style favoured by many larger companies, and a recognition that knowledge needs to be shared throughout companies. "It's not enough right now for just one division to be doing business intelligence," Kris Slethaug, director of Asian marketing for competitive intelligence software provider Factiva, said.

Slethaug believes that remote offices in particular need more information. This view is echoed by other developers. "As organisations get more and more virtual, they need a new software architecture," Peter Raue, CEO of German BI developer MIS AG, said (the company recently set up an Australian subsidiary).

Global growth has led companies such as MIS AG to expand, but this doesn't mean business intelligence companies are immune to the instability of the technology sector. For instance, Cognos — one of the most prominent developers of BI tools —

announced in late May that it was laying off 300 staff members (around 10% of its workforce). However, developers and consultants agree that key changes have kept the segment relatively healthy by winning new customers and wringing more dollars from existing users.

## Web time

If there's been a major change in the business intelligence market in recent years, it has been the shift away from using dedicated desktop tools (spreadsheet clones with prettier graphics) to access information. Instead, browser-based access has become the key trend, and information is now made available directly from the corporate intranet. (See 'Business intelligence in action' for some examples of the different approaches.)

Manufacturers are seeing varying patterns of take-up for the Web-based products, but most agree that they're becoming dominant. "The whole market has moved that way; 90% of our deployments have a server-based Web application. It's been dominant for the last 18 months," ZapTech's Lingard said.

Brio's Beks cites a similar figure. "It probably represents 90% of the business at the moment," he said. Australia may be ahead of the world in this regard. MIS AG's Raue estimates that the company's European sales are split evenly between conventional desktop and Web versions. The Web-centric trend is unlikely to slow down any time soon. "It's a convenient rollout mechanism," Steve Hitchman, managing director of Australian data warehousing consultancy MIP, said. "Rolling it out over the intranet makes it cheaper and easier." Others agree. "The widespread accessibility of the Internet leads to a convergence of functionality," Factiva's Slethaug said.

Whatever the interface, the basic concept of BI tools hasn't changed. "All BI is about multidimensional access," Lingard said. "It's more user-friendly from a non-technical standpoint. You can build a logi-



cal drill-down into the information." The integration of BI into portal systems also reflects a more general trend to combine enterprise software packages into a single point of access. "The objective is to make enterprise information available and manageable regardless of location, and ensuring that it is as current as it needs to be," IDC analyst Carl Olofson noted recently.



▲ "The Web interface has been dominant for the last 18 months."  
— Matthew Lingard, ZapTech

## Getting it right

In their early incarnations, BI packages were sometimes criticised for producing out-of-date or uninformative results. However, in recent years they have benefited from increasing interest in setting up accurate repositories of company information. Once data warehouses are established, it's relatively straightforward to connect them to BI tools, and to work through that data for insights.

Just how straightforward this is remains a matter of some dispute. "It is possible to take a BI tool out of the box, attach it to a database and get worthwhile information... but if you're going to do a very large deployment, you require an operator with quite a lot of prior knowledge," ZapTech's Lingard said.

Others are less confident. "The expectation is that you buy something, you take it out of the box, and you've got a brilliant business intelligence system," MIP's Hitchman said. "But it doesn't turn out that way. The data's generally a mess, so it doesn't work."

Manufacturers and consultants agree that without clean data to work from, as well as input from business planners rather than technicians on what needs to be measured, BI packages aren't much use. "It doesn't happen unless the business people buy into the whole process," Lingard said. "It's about business enabling, not technology."

Beks concurs. "It's important to make sure that there's a business reason for doing it. The most important question is: what are the metrics?" he said.

The problem of ensuring that data drawn from transactional systems is accurate is underestimated by many



▲ "People's data is still a mess."  
— Steve Hitchman, MIP

BI aspirants. "Once we have the information in these cubes, one of the key points is protecting data integrity," noted Lingard. It's also important to draw on all relevant data sources. "The best thing is to combine your different data stores," MIS AG's Raue said. "The focus is on trying to get consistency," added Beks. Consistency is a far-off goal for many businesses. "People's data is still a mess," said Hitchman. "Only 5% of organisations out there have a suitable data integration platform." In MIP's experience, data needs to be clean, assimilated, and qualified on a daily basis to be usable in BI applications. As Hitchman pointed out, "Nobody wants a data cemetery."

## The future

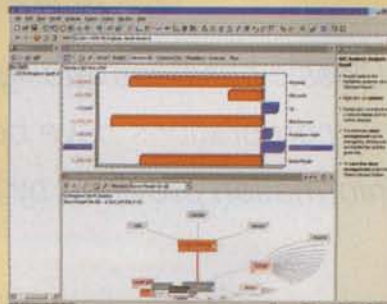
What changes are ahead for BI tools? Lingard foresees a boom in interactive handheld access to business data, but argues that our current wireless infrastructure needs improving. "We don't have enough bandwidth," he said.

MIP's Hitchman foresees a greater demand for more sophisticated analysis. "All the BI tools usually work for basic tasks," he said, but people are looking for analytical applications that can identify trends such as return on investment and customer churn, "not just data access". That's no easy task. "To build a proper customer analysis system takes months, maybe years of work." The companies that succeed in doing so could even make money by sharing that expertise with others. Lingard foresees a growing trend towards the exchange of business intelligence tools and techniques between companies in similar fields.

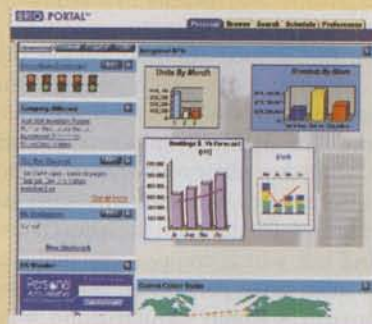
Other changes include new means of visualising data. Brio's Beks predicts that reliance on innovative measures such as tying data directly into regional maps will edge out the 'classic' graphic approach. These measures are already available in many BI packages, but haven't been fully exploited by the market yet.

Ultimately, it doesn't matter how intelligent the system is, or how sophisti-

## Business intelligence in action



MIS's Delta Miner 4.0 has many of the elements found in an older-style business intelligence tool. Starting from the graphical overview shown here (elements behind budget are in red), managers are able to click on any column for a more detailed analysis of problem areas. The tree in the bottom half of the screen shows some of the other variables that can be measured.



Brio Portal presents similar information but uses a Web-based portal interface, which is now the most popular choice for business intelligence software users. Along with graphical information about business performance, other common portal elements include video news feeds and bookmarks. The two approaches shown here aren't mutually exclusive; Brio also offers a desktop tool, and MIS has a portal interface as well. Almost all key BI developers now offer both of these options.

cated the presentation is; human input remains vital. "There's no business intelligence in a graph," said MIP's Hitchman. "But there's business intelligence in a graph if you've got intelligent business measures." Even then, "it doesn't tell you anything unless you click on the right column."

Angus Kidman



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# Certifiable behaviour

*MCSE certification holders need to requalify by the end of the year.  
What's the best way to train for certification?*

**T**he Microsoft Certified System Engineer (MCSE) certification is one of the most sought-after qualifications in the IT world. It is one of four professional certifications that make up the Microsoft Certified Professional Program, which helps employers to recognise IT professionals who are knowledgeable in Microsoft software and technologies.

However, even those who have passed all the exams and gained the coveted certification can't be complacent. Microsoft has introduced new Windows 2000 exams that existing MCSEs must pass by the end of this year to keep their certification up to date. Fortunately, requalifying could be as simple as passing a single test.

The minimum requirement for gaining an MCSE certification is passing five core exams and two elective exams. These exams cover a wide range of knowledge about Windows and its associated networking technologies. They're multiple choice, but they're no walk in the park. Preparing for the MCSE certification exams requires a lot of time and effort.

There are two main ways to prepare for your exams: by attending classes at certified training centres, or through self-paced study. It's essential that you are comfortable with the technologies that you will be tested on, and having hands-on experience is the best way to ensure this. It's best to try to get as much experience as possible, either through your job, through the training centre labs or by setting up a home lab.

There are hundreds of education centres across the world that provide MCSE certification courses. You'll find a listing of all the Microsoft certified training centres throughout Australia on this month's cover CD. The courses offered by these centres take quite a few days and evenings to complete. They don't come cheap, either; prices range from \$1,000 to \$3,000 for a single course.

If you began working in the IT industry without going to university, you might be interested in a new university course introduced this year: a Bachelor of Computing (Networking Technologies) degree with MCSE certification. This fast-track degree has been made available through a partnership between Microsoft, Deakin University, and Com Tech Education. The three-



and-a-half-year program guarantees an IT job within the first year, so you can gain valuable industry experience, as well as an income, while studying part-time.

If self-paced study is more to your liking, there is a multitude of MCSE certification books to assist you in your preparations. These books are also fairly expensive. There are countless publishers with different ways of explaining the various MCSE certification topics, so to assist with the book selection process, APC has put together a review of different titles from publishers including Microsoft Press, Coriolis, Sybex and Syngress, which can be found on the cover CD.

You can supplement your self-paced study with a variety of online teaching tools. These include tutorials, sample exams and advice from experienced MCSEs. Once you have taken the classes, slogged through the books, and saturated your brain with all things Microsoft, you need to book into an exam. There are two certified testing centres in Australia: Sylvan Prometric and Virtual University Enterprises. You can register by phone or on their Web sites (see 'More information'). When you register, you learn more about where and when to go, and what to expect. It costs \$155 every time you take an exam, but you can retake them as many times as you need to.

If you have already achieved MCSE status, you need to update your knowl-

edge from Windows NT to Windows 2000. This involves passing the four core Windows 2000 exams. However, if you act fast, you can take advantage of a single exam that incorporates them all. This exam is called 70-240 Microsoft Windows 2000 Accelerated Exam for MCPs Certified on Microsoft Windows NT 4.0, and is offered to any candidate who has passed all three Windows NT 4.0 exams: 70-067, 70-068 and 70-073.

The deadline for taking this accelerated exam is December 31, 2001, and eligible candidates can take the exam for free. To do so, you must order a voucher by November 1 from Microsoft's MCP Web site at [partnering.one.microsoft.com/mcp](http://partnering.one.microsoft.com/mcp). You only have one chance to pass this accelerated exam, but even if you fail, you get a good idea of the kinds of questions and topics that the core exams cover, as well as an assessment of your strengths and weaknesses.

Microsoft is not the only company offering certification. IT professionals certified in Cisco, Lotus, Novell, 3Com and Red Hat products are also in demand. We'll explore other certifications in coming months.

*Kieran McNamee*

## More information

There are two main testing centres for MCSE certification:

- Sylvan Prometric  
[www.prometric.com.au](http://www.prometric.com.au)  
(02) 9903 9797
- Virtual University Enterprises  
[www.vue.com/ms](http://www.vue.com/ms)  
1800 356 022

More information on the IT degree from Deakin University can be found at [www.itdegree.com.au](http://www.itdegree.com.au).

APC recommends the following MCSE Web sites for pre-exam preparation:

- [www.mcseguide.com](http://www.mcseguide.com)
- [www.mcsetutor.com](http://www.mcsetutor.com)
- [www.mcmcse.com](http://www.mcmcse.com)
- [www.2000exams.com](http://www.2000exams.com)
- [cramsession.brainbuzz.com](http://cramsession.brainbuzz.com)

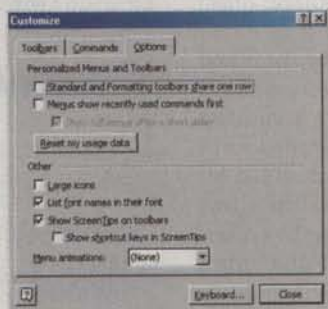


# Simple tricks

Getting the most out of your computer doesn't have to mean mastering complex tasks or esoteric command-line options. Sometimes, it's the simple changes that can make your PC experience more productive and enjoyable.

One of the more useful tricks Workshop has mastered was learning how to switch off the 'intelligent' menus found in more recent incarnations of Office (and Windows) which hide commands that are seldom used. This can be good for novices, as it can help to minimise confusion, but it is a nuisance for the more experienced, who know what they want, even if they don't want it all the time, and don't appreciate having to click on an extra pull-down bar to get it!

If the lack of visible menu options is driving you crazy, here's how to fix the problem in Office. Select the Customize option from the Tools menu in the application, and then select the Options tab. Deselect the 'Menus show recently used commands first' to restore menus to their full glory. Alternatively, you can leave this selected, but also select 'Show full



menus after a short delay', which provides a compromise.

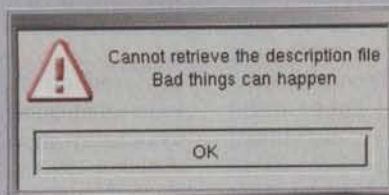
This month, several columns continue the theme of simple, handy enhancements. Windows 2000 users can ensure that their preferred desktop settings are always available, using our guide to IntelliMirror, while Windows 98 users can solve the problem of the right-click menu in Explorer, which contains so many options that you can't find the one you want. Step by Step explains how to stop rogue applications from tracking your Internet use, and conversely, Insite shows how to track visitors to your own site using ASP and Access. Many of this month's shareware inclusions (reviewed in full on the cover CD) also offer ways to enrich your daily experience with simple enhancements.

Archives of all Workshop columns can be found on the APC Web site at [apcmag.com](http://apcmag.com). We also welcome suggestions for improvements or additions to Workshop. Please use the feedback form on our Web site, email us at [apc@acptech.net](mailto:apc@acptech.net), or send snail mail to: APC Workshop, PO Box 4088, Sydney NSW 1028.

## Bug of the month

This error message from the Gnome window manager (sent in by Desirée Piesse) caught our fancy.

We don't get a lot of bugs submitted for Linux systems. We could probably start a flame war by speculating as to whether this is due to Linux's superior stability or the size of its user base — but we'd never stoop to that.



Anything and everything buggy deserves a mention.

Send us your favourite

bug via email to [bugs@acptech.net](mailto:bugs@acptech.net) or snail mail to APC Bug of the month, PO Box 4088, Sydney NSW 1028, and you'll be in the running to win a

software prize. Please send screen captures, example code listings or detailed instructions for triggering a bug in an application, as appropriate for your entry.

The winner's name, along with details of the bug, will appear in this column in APC September.

So start hunting!



Michael Smith

## Win! Win! Win!

Workshop is always on the lookout for the strangest, funniest, most interesting or downright weird software bugs. These include code snippets, features that function poorly, or things that crash a particular application.

## Contents

### This month in Workshop

Our **5 Minute Guides** explain how MIDI and DLS technologies spread sound around the Internet and also explore the concepts of honeypots and honeynets. **126**

In **Bibliofile** we cover titles on WAP, MS troubleshooting, technology and business, online retailing, and cryptography. **132**

You may be running spyware on your computer without even realising it, but **Step by Step** shows you how to defeat it. **136**

The **Windows** column looks at how IntelliMirror can provide you with easy access to your personal and data settings, and how to customise your right mouse button in Windows 98. **137**

This month's **Linux** offers advanced commands for use in the CVS repository. **140**

In **PDA's** we compare the performance of a USB connection with a serial port. **142**

**Mac OS** reviews the new networking features in Mac OS X and sees how they measure up. **144**

Learn about structures to make working with binary files easier in **Practical C++**. **146**

**Practical Java** looks at controlling data structures with existing Java classes from the Java class library. **149**

**Insite** shows you how to use Access and ASP to track visitors to your site. **151**



*MIDI and DLS are key technologies for helping to spread sound around the Internet, but how do they work exactly?*

# Sound of the crowd

## Some Web sites have music that downloads really quickly. How do they do that?

As any seasoned Napster visitor knows, downloading music files can be a time-consuming business, which is why relatively few sites include 'live' music which plays as soon as a person visits. Those that do, generally use MIDI (Musical Instrument Digital Interface), a compact means of storing music digitally. (The urban legend site [snopes.com](http://snopes.com) is a good example of MIDI sound in action.)

MIDI essentially specifies which notes are to be played, how long they last for, and which 'instrument' should play them. Other effects, such as volume and reverb, can also be defined. This allows for much more compact storage than audio formats which describe (with varying degrees of accuracy) the acoustic waveforms associated with a piece of music. A minute of audio stored in a MIDI file can occupy as little as 10K, compared with around 1M for the same quantity of data in an MP3 file of moderate quality.

Although it is supported in most major Web browsers, the MIDI specification predates the Web by some years. It was originally created in 1983 to allow easy exchange of data between synthesizers, other electronic musical instruments and PCs. That continues to be its major commercial use, but a quick hunt for the word 'MIDI' on any search engine will show that the creation and exchange of MIDI files has also become a major online hobby.

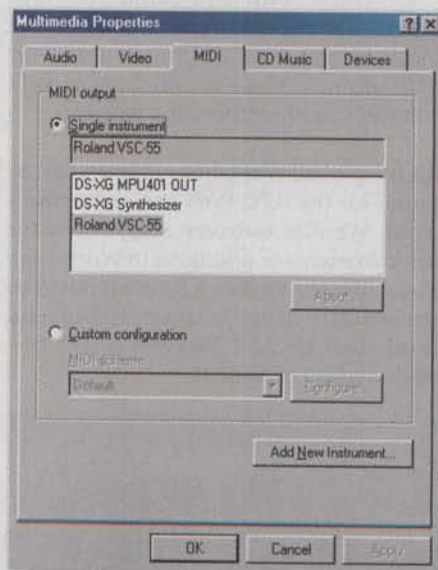
MIDI isn't the only way to add 'live' music to a site. Technologies such as Macromedia's Shockwave player are also sometimes used for this purpose, and others such as Beatnik and QuickTime build on the MIDI specification. Despite recent improvements, these are generally much slower to load than MIDI files. They're also not as easy for novices to integrate into sites, and the tools to develop them aren't available for free.

## Why does MIDI-generated music sound so cheesy?

A MIDI file basically just says 'play this note on this instrument for this long', so

the quality of MIDI file output is crucially dependent on the MIDI playback system (also known as a synthesiser or sound engine) installed. Your PC's original configuration, the soundcard you use and the software you have installed will all affect the quality of the sound.

High-quality soundcards or dedicated commercial software synthesis systems can reproduce MIDI files more accurately than the basic software installed with Windows, or the synthesis provided by cheaper soundcards. Windows users can see which sound engine is in use by accessing the Multimedia option within Control Panel and then selecting the MIDI tab.



▲ Windows allows you to switch between MIDI playback systems.

No matter how good your synthesiser is, there are some fundamental restrictions when using MIDI. Each sound engine will reproduce given instrument sounds slightly differently, so there are no absolute guarantees about how the final rendition will sound. A sub-specification known as General MIDI defines a 'standard' bank of instruments which is relatively similar between different devices, but it's still not perfect, especially for more subtle acoustic instruments.

There is also no way for a MIDI file to incorporate speech or vocals. For this reason, MIDI tends to be used for brief, simple instrumental themes, even though it is capable of reproducing much more complex compositions.

## How can I add MIDI sounds to my Web site?

Assuming that you already have MIDI files on hand, you can easily add a background sound to any page on your site by including the following code (the example MIDI file is called `tune.mid`):

```
<embed src="tune.mid" hidden="true"
autostart="true" loop="yes">
```

This can be placed anywhere in the file, but you may want to use it near the end of the page so that the display of the main text isn't delayed while the MIDI file is downloaded. The 'loop' attribute is used to control whether the file plays continuously; if set to "no", it will simply play once each time the page loads.

Internet Explorer supports a simpler tag, `bgsound`, but it doesn't always work in Netscape or other browsers. If you want to make playing a MIDI file an option, use a command such as this:

```
<a href="tune.mid">Click here to play
tune.mid</a>
```

Depending on your browser and system configuration, this may cause an external player to load.

## Could solutions be found?

The voice problem will probably have to wait until broadband is common enough for existing formats such as MP3 or RealAudio to be loaded quickly, but progress is being made on making MIDI file playback more predictable. A specification known as DLS (Downloadable Sounds), first introduced in 1997, is the most promising.

DLS aims to work around the problem by allowing composers who use MIDI to provide precise specifications of the sounds of specific instruments, ensuring more accurate reproduction. However, this is at the expense of somewhat larger files. Support for DLS has been progressively introduced into browsers, operating systems and MIDI-equipped instruments, but will probably only become noticeable as more composers and site designers take advantage of it.

Angus Kidman



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Cat. 3393

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### Connect Two Monitors to Your Computer

Allows the simultaneous connection of two monitors from one VGA port. It's great for training presentations or in situations you need two monitors to display from one computer. An inbuilt amplifier ensures there is no reduction in image quality.

Cat. 15092-1 Dual Monitor Adapter

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Cat. 15094-1 PS/2 to USB Adapter

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*Sticky network security situations can be avoided if you set the right traps.*

# Honeypots and honeynets

## What's a honeypot got to do with network security?

Some networked PC systems are so complex that no one person can be expected to identify every possible security flaw. Even with a dedicated team of security researchers, many vulnerabilities won't be detected until software is actually in use. This is why network managers have to devote a fair amount of their time to tracking and implementing network security patches.

To make matters worse, much of the knowledge about where vulnerabilities are resides principally with hackers, who aren't likely to promote or publish their discoveries using conventional channels. After all, as long as a flaw hasn't been discovered by the software developers, any system running that software remains open to attack.

To extract information from such individuals (often known as 'blackhats' within the network security community), systems known as 'honeypots' are set up. These appear to be conventional working network servers, but have been set up solely to attract hackers (hence the name), and aren't connected to any commercially sensitive data. When the systems are compromised, monitoring tools can reveal how this happened, leading to better knowledge of how to secure particular OSes.

Techniques for implementing honeypot systems vary. Some are set up to emulate well-known server operating systems, but more experienced hackers can detect this technique and may choose to ignore such temptations. There's also the risk that the emulation may not be perfect, and thus doesn't reflect real conditions. Many honeypots are set up with the standard 'out of the box' configuration; others may have alterations made to various configuration elements to test whether these result in a greater threat.

## How do hackers find honeypot systems? Are they announced on newsgroups or something?

Researchers experienced in setting up honeypots claim that no special effort needs to

be made, even indirectly; for example, by announcing a new Web site hosted on a honeypot server. Hackers are constantly seeking new machines to conquer. The FAQ for the Honeynet Project, one such research group, notes that the group does "absolutely nothing" to announce the existence of new systems. "The blackhat community is extremely aggressive; you would be surprised at what they will find," it adds. Not actively promoting the systems also simplifies legal issues if a prosecution results, as the hackers can't claim that they were lured to the site for the purposes of entrapment if they discovered it entirely on their own.

## What's a honeynet?

As you might expect, a honeynet comprises a network of systems designed to attract hackers, rather than just a single honeypot machine. The name comes from the Honeynet Project, started by a group of 30 volunteer researchers to improve network security knowledge.

The Honeynet Project's stated aim is "to learn the tools, tactics and motives of the blackhat community, and share those lessons learned". This is achieved principally by means of a series of white papers and security alerts published on the project's Web site at [project.honeynet.org](http://project.honeynet.org).

By creating the honeynet system as a single network, all traffic that comes to the network can be tracked using a dedicated firewall (a more reliable method than some other tracking systems, such as keystroke capture). The configuration of machines within active Honeynet Project honeynets is also changed frequently, to expose vulnerabilities within particular OSes or configurations. The Honeynet Project doesn't use emulated systems, claiming that they offer less value than real-world production systems, but there's no technical reason that a honeynet system couldn't be set up to do so.

## Why set up a honeynet or honeypot?

The answer comes down to two key areas: curiosity and commerce. Just as many 'blackhat' hackers are motivated more by a desire to see if a system can be compromised than to do any actual



damage, security researchers are interested in discovering new means by which their systems may become vulnerable. Their goal (blocking those holes) may be different, but the fundamental desire to learn is the same. The fact that groups such as the Honeynet Project are run entirely by volunteers demonstrates the appeal of learning more about this area.

The other motivation is to prevent the loss of commercially sensitive data. Placing a honeypot or honeynet within a commercial organisation can give a good indication of how frequently, and in what ways, a system might be attacked. In highly networked environments, such information is extremely valuable.

## Is network security really such a big issue?

Certainly. Research by the Honeynet Project suggests that if a standard Red Hat Linux 6.2 server system goes live, it will be penetrated by hackers within 72 hours, and often much sooner. While the security fixes to avoid such a problem are relatively easy to implement, the speed of attack demonstrates how vulnerable any network-connected system can be. And the costs can be high: a 2001 study by the Computer Security Institute found that companies which suffered from network intrusions sustained average damages of \$US2 million. The cost of a little proactive investigation is much lower.

Angus Kidman



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Going to seminars? There's a lot of information to try and absorb at once. Instructors often assume you have a good understanding of the subject before you even start - then there's the time out of work, not to mention the cost.

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### IT JOBS GROWTH

The Morgan and Banks Job Index Survey found that 59.1% of employers are planning to hire IT staff during 3 months to April 30th and the trend will continue. MBT director Ian James said "Don't believe all the doom and gloom demand is still outstripping supply".

APC Magazine April 2001

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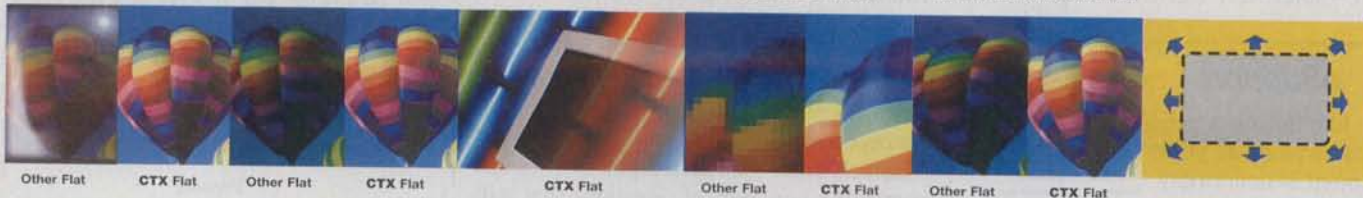
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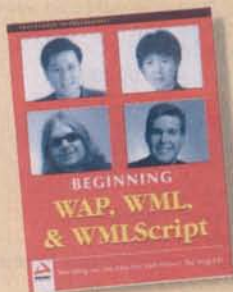
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The book outlines the main constructs used in WML and WMLScript, as well as discussing means of building dynamic sites using ASP and XSLT. Assuming virtually no prior knowledge, it provides accurate, concise overviews of a whole host of scripting concepts, along with numerous working



examples built around a prototype travel agency application, which can be downloaded from an associated Web site.

More experienced programmers will breeze through the early chapters and gravitate to the detailed discussions of rendering differences between WAP phones and tips for improving the accessibility of WML-based sites. The last few chapters focus on using XSLT to create browser-specific sites.

With a healthy dash of humour, *Beginning WAP, WML, & WMLScript* could serve as a model for writing about any Web programming topic. It is highly recommended.

Angus Kidman

**Author** Wei Meng Lee, et al.  
**Publisher** Wrox  
**Contact** McGraw-Hill  
**Phone** (02) 9415 9899  
**Price** \$87.95  
**ISBN** 1861004583  
**Rating** ■■■■■■■■

## Microsoft Troubleshooting series

In technology publishing, a series breeds success — just look at the Dummies books and their imitators. Microsoft Press is attempting to seed its own serial garden with its new Troubleshooting range. Titles cover the major Office applications, Windows variants and general PC assistance, and each book is designed as a reference tool rather than a cover-to-cover read, providing overviews of two or three pages on how to solve particular problems.

They are all written by different authors, but the seven volumes currently on offer

The Web site features monthly content updates, which are occasionally useful, but not particularly compelling. They also suffer from a lack of proofing. For instance, some of the sections on Web markup haven't been marked up correctly, with the result that the tags that are being discussed do not appear in the text. This is exactly the sort of confusion such a series should aim to avoid. The flowcharts can also be accessed online, but they will refer to the printed text unless the solution requested is one of the new ones posted online.



have been edited to a high degree of uniformity. Except for the author and subject names, the covers are also identical.

The introductions make much of the flowchart at the beginning of each chapter, which is supposed to direct you to the appropriate solution, but we found in practice that it was often easier to use the index to track down individual problems. In general, the solution texts are accurate and carefully written, with liberal use of screenshots. While the titles aim to keep the solutions brief and simple, we did find that in some places they encouraged actions (such as drive format conversion) that it might be better to perform following a backup, or at least some thoughtful contemplation.

The Troubleshooting books also have a companion Web site that is only available to purchasers of the titles. Predictably, registration for the site requires signing up for Microsoft's Passport service, but it doesn't restrict you to the content related to the book you own.

Despite their limitations, the books could be a useful addition to a beginner's shelves, especially the PC and Windows titles. The application titles don't seem to cover much ground that isn't already in the comprehensive Office help system, but the format may appeal to some.

Angus Kidman

**Author** Varies  
**Publisher** Microsoft Press  
**Contact** Woodslane  
**Phone** (02) 9970 5111  
**Price** \$44.95 each  
**ISBN** *Your PC*, 0735611637;  
*Windows*, 0735611661;  
*Windows 2000 Professional*, 0735611653;  
*Your Web Page*, 0735611645;  
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## Tech Trending

Ignoring the general public by declaring its audience to be "visionary managers", *Tech Trending* aims to provide a managerial guide to implementing computing technologies into business.

The book is aimed at those in middle to high-level management with little or no experience with computers. It is these people who are often responsible for huge outlays on computing technologies, and *Tech Trending* tries to ensure that such managers can make reasonably well-informed choices.

The book covers topics such as tracking technology trends, realising which technologies are worth implementing, managing and setting up an efficiently networked office, effectively utilising the knowledge of systems analysts, training staff and dealing with resistance.



The book contains a surprising amount of pertinent information, and its layout and language are accessible.

Zuckerman has developed a series of buzzwords and synonyms which she uses to the point of tedium. Talk of 'technohipsters', 'technozombies' and 'technostress' becomes tiring, as is the incessant referral to the reader as a 'tech trender' and 'visionary manager'.

Managers who can tolerate the self-indulgent language will find that *Tech Trending* offers some useful insight. However, everyone else is advised to stay well clear.

Alan Crawford

**Author** Amy Zuckerman  
**Publisher** Capstone Publishing  
**Contact** John Wiley & Sons  
**Phone** 1800 777 474  
**Price** \$58.95  
**ISBN** 1841121371  
**Rating** ■■■■■■■■

## Clicks, Bricks and Brands

The last few years have seen a huge growth in the number of online retailers, many of which have failed, or have been swallowed up by larger players. The optimism that originally characterised the burgeoningetail industry has now been replaced by a more realistic understanding of the limitations and risks associated with conducting business in cyberspace.

This book provides a comprehensive, up-to-date discussion of this phenomenon, including a detailed analysis of the relative strengths and weaknesses of online (clicks) and offline (bricks) retailing.

The author draws on the experiences of a number of online ventures to explain how business models that exploit the strengths of both worlds have the best chance of success. Practical advice is also given as to how business managers can



identify and exploit these strengths. At the core of this model is brand trust and the author devotes a significant part of the book to describing how to generate and nurture it online.

The book has a Web-based companion that updates and expands upon the content of the hard copy, which makes this title exceptional value for money.

The book can be a bit evangelical. It over-repeats the key messages and provides a generous dose of truisms. However, this is a perceptive and detailed account, and is recommended to anyone interested in the clicks-and-mortar game.

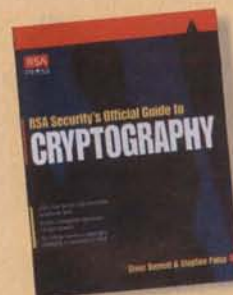
Jon Gill

**Author** Martin Lindstrom  
**Publisher** Hardie Grant Books  
**Contact** Hardie Grant Books  
**Phone** (03) 9827 8377  
**Price** \$59.95  
**ISBN** 1876719435  
**Rating** ■■■■■■■■

## RSA Security's Official Guide to Cryptography

Security is one of the biggest concerns when moving to online transactions, communications and infrastructure. Even for the home computer user, keeping prying eyes out of files and emails is important. But cryptography is a confusing subject, and this is where this title comes in. It covers everything you've ever wanted to know about the RSA encryption algorithm.

The RSA algorithm is one of the most widely used encryption methods and was the basis for the PGP software program that highlighted the US government's classification of the algorithm as a munition. Trading in a useable form of the algorithm carried the same penalties as gun smuggling, but geeks revelled in



wearing shirts emblazoned with the algorithm and 'I am a munition'.

The encryption is extremely powerful and can be made harder to crack, so there were limits placed on the power of the algorithms you could use. Recently, the US government has loosened its restrictions, which is why this guide has been produced. Featuring easy-to-understand workings of the algorithm, case studies, links to hardware vendors and safe ways to implement RSA, it's an excellent guide. It also comes with a CD full of sample programs, demos and the latest versions of the RSA algorithm.

Darren Ellis

**Author** Steve Burnett & Stephen Paine  
**Publisher** Osborne McGraw-Hill  
**Distributor** McGraw-Hill  
**Phone** (02) 9415 9899  
**Price** \$109.95  
**ISBN** 007213139X  
**Rating** ■■■■■■■■



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Don't want your Web surfing habits monitored? Better find out how you can defeat spyware.

# Beating spyware

**M**ost people using a computer don't know what spyware is, but a lot of them are probably running it.

Spyware is software that uses your Internet connection to send information about your computer and the way you use it to somebody. This tracking function keeps an eye on which Web sites you're visiting, and may search your Web browser history for sites you have visited in the past, or check what other software you have installed on your computer.

The information is sent to a company that can, and probably will, use it to market things to you. It can also be sold to other marketers. Some free programs just display ads and use your Internet connection to download new ads. This 'adware' may be annoying, but it's not necessarily spyware. It only qualifies as spyware if it sends data back to somebody.

An increasing number of free-to-download software applications have spyware functions, including some very popular ones. Even some commercial software does. Usually, the spyware functions reside in a separate application from the one you think you're installing. The spyware application often runs all the time, whether or not you're running the program that it came with.

The installer may give you the option of installing the main application without the spyware, but this is not usual. Generally, the installer does *not* point out that you're getting spyware along with the program you want. Spyware makers generally have privacy policies that prohibit them from collecting any identifying data, but you're still contributing to their databases.

Apart from the privacy issues involved with spyware, it can have a detrimental effect on your PC. Multiple background



spyware tasks don't make your computer any faster, and spyware may have security weaknesses that make your system more accessible to crackers. If you pay by the megabyte for your Internet access, you will also be paying more for the spyware program's traffic.

In addition, spyware can misbehave. For instance, the dssagent.exe program installed with various Broderbund applications does not play well on networks that don't allow it to resolve the Internet domain names to which it wants to connect. If it fails, it instantly tries again. This can cause an enormous amount of nonsense traffic on corporate networks, and any TCP/IP LAN that doesn't have an Internet connection.

Windows spyware applications are generally very inconspicuous. They start silently whenever you boot your computer, and they don't have a readily identifiable process name.

Some spyware is easy to uninstall, if you know it's there. It can have its own entry in the Start Menu, or be in the list you get when you run Add/Remove Programs from the Control Panel.

However, most spyware doesn't make itself known to you in any way, and has no simple uninstallation mechanism. You can weed it out by removing the relevant registry and/or config file entries, or just by killing the spyware task from the Task Manager in Windows NT and Windows 2000 (the Windows 95/98/Me Close Program dialogue box won't necessarily show you the spyware task,

or you may not be able to tell which one it is) and then deleting the relevant directory. This is rather daunting for most people, as well as annoying.

Fortunately, you can zap spyware without resorting to editing your startup files and registry manually. There are a few anti-spyware applications, but the best is Ad-aware, made by German outfit Lavasoft. Ad-aware is a free download (with no strings attached, and available on this month's cover CD) and its sole purpose is to scan Windows systems for various types of spyware and give it the boot. This is uninstallation with extreme prejudice, and removes all registry and config file droppings left by the spyware as well.

If Ad-aware can't get rid of all of the spyware files because some of them are marked 'in use' and locked by the operating system, it just makes sure they won't run again when you restart the computer, and tells you to reboot and run Ad-aware again. The second time around, the files are history.

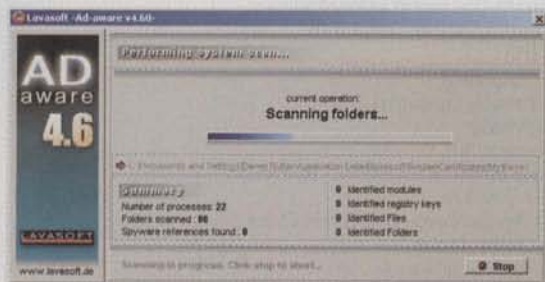
Ad-aware gives you a list of spyware references it has found, from installed applications to Web ad company cookie files, and allows you to uninstall items selectively. Unless you are particularly attached to the cookies, there's no harm in uninstalling those, too.

Daniel Rutter

## More information

There are plenty of Web sites that deal with spyware and similar software that people install without knowing they're doing so. Lavasoft's site, which carries the latest version of Ad-aware and other tools available for download, is at [www.lavasoft.de](http://www.lavasoft.de). Spychecker, at [www.spychecker.com](http://www.spychecker.com), is a software database that will tell you whether a given application has spyware functions.

Another list of 'spyware-infested software' can be found at [www.infoforce.qc.ca/spyware](http://www.infoforce.qc.ca/spyware). And the Counterexploitation site at [cexx.org](http://cexx.org) has a list of adware/spyware titles, as well as a good rundown of the problems with spyware, at [cexx.org/problem.htm](http://cexx.org/problem.htm).



▲ Ad-aware can find and destroy spyware on your computer.



For a complete archive of APC Step by Step columns, see [apcmag.com](http://apcmag.com).



Daniel Rutter can be contacted at [dan@dansdata.com](mailto:dan@dansdata.com).



*IntelliMirror provides Windows 2000 users with ready access to their data and personal settings.*

# IntelliMirror on the wall

**T**he Windows 2000 operating system allows administrators to concentrate on managing the people who use computers, rather than on the computers themselves. IntelliMirror makes life easier for administrators and the people they manage by intelligently mirroring data, settings and software. With IntelliMirror, you can have constant access to all your information and software, whether you're connected to the network or not.

The main purpose of IntelliMirror is to make your computing experiences identical, regardless of the computer you use or whether a network connection exists. Many people should remember the Briefcase folder from Windows NT 4 and Windows 95. Those who've tried to use it know that getting it to work is more than a little confusing. IntelliMirror aims to provide many of the same features, only this time it works.

IntelliMirror is not a specific tool, but rather a number of Windows 2000 technologies combined to provide an intelligently customised working environment. The main Windows 2000 features that IntelliMirror relies on are Active Directory and Group Policy. Other features include Offline Files, the Synchronization Manager and Windows Installer.

To get the most out of it, your organisation needs to run Windows 2000 on both the server and client side. The differences between the registries of Windows 95, Windows 98, Windows NT and Windows 2000 prevent IntelliMirror from working across mixed Windows environments. Having said that, there are a couple of features, such as synchronising offline files, that do not require Windows 2000 Server or Active Directory and can be implemented by individuals and small organisations.

## Data that follows you

The perfect working environment is one where you can sit down at any workstation, log in, and have all your data available, along with a Windows desktop configuration that you're familiar with. In the past, an office network could be set up with a central server that stored everyone's data, but the information that could be stored was limited, because most preferences were saved as local settings. In Windows 2000, almost all data and settings are portable. If a networked PC malfunctions, all that needs to be restored is the system software, as all

data and individual settings remain on the server.

Files that you want to be available offline do not need to be copied to a separate location. Just right-click the file or folder and select Make Available Offline. IntelliMirror maintains the collection of files that you've marked for offline use in a special folder and uses this folder for synchronisation.

There are a number of ways in which synchronisation occurs. You can have IntelliMirror perform synchronisation when you log on and off, when your computer is idle for a period of time, or at scheduled times. These synchronisation settings and others can be accessed from the Tools menu in Windows Explorer or by selecting the shortcut found under Start, Programs, Accessories.

The My Documents folder that resides on the Desktop usually includes the files found under C:\Documents and Settings\username\My Documents, where the username is that of the person who logged in. The target folder of the My Documents folder can be changed to any other local or networked folder. In a networked environment, you will be able to access all your files from the My Documents folder, even if they're stored elsewhere on the network.

The My Documents target folder can easily be modified by right-clicking My Documents and selecting Properties. Under the Target tab, you can change the default location for My Documents to another location on your network or another local folder. When the My Documents target folder is set for offline use, all saves are made to the network and then synchronised back to the local computer.

A disadvantage of accessing files over a network is that it is slower than accessing a file on a local hard disk. IntelliMirror is smart enough to limit access to networked files to a minimum by caching regularly used files on the hard disk. When you open a file, IntelliMirror checks to see if the file resides on the hard disk and then compares it to the one on the network. If they match, it will open the local copy. If the networked file is different to the local file, IntelliMirror updates the local file and opens it.

If IntelliMirror detects that the server is no longer accessible, files that are marked



▲ The Offline File Wizard will run the first time that you make a file available offline.

for offline use will seamlessly work out of the cache. You don't even have to worry about the actual location of the files when you are no longer connected to the network. The cached files will retain their UNC (Universal Naming Convention) names, so it will seem that they are still on the network.

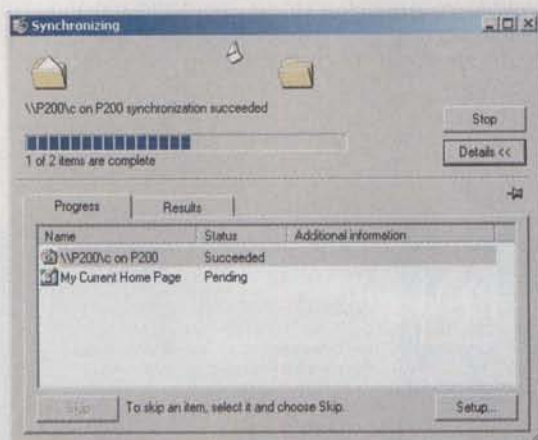
For instance, one day you may be in the office working on a file called results2001.xls, which is stored in the Finance folder on Server1. The next day, you may be at a conference and need to update the results2001.xls file. IntelliMirror saved the most recent version of the file to the hard drive before you disconnected and you don't have to fossick through Windows Explorer in order to find the file. The cached file can be found in exactly the same location that you would find it in when connected to the network: Server1\Finance\results2001.xls. This means that all links to the file, such as those in the Excel File menu, remain valid.

When you next connect to the network, IntelliMirror will update the networked version of the file. If someone has made other changes to the file, IntelliMirror will recognise this and give you the option to overwrite the file, save both files or just leave it as it is.

## Customised settings

The Windows desktop is often customised. Some people like a magnificent landscape photograph, while others are satisfied with a plain blue background. Some like to get into the Control Panel and tweak a variety of settings relating to the display, mouse and keyboard, while others are happy with the defaults. All of these preferences can be





▲ How long synchronisation takes depends on how many files are available offline.

stored on the server to provide an individual experience for each person whenever and wherever they log on.

Along with basic Windows settings, IntelliMirror can also look after other data, such as the Internet Explorer Favorites list, Web page cookies and the Outlook address book. IntelliMirror ensures that only vital user and administrative settings information is retained, while temporary and local computer settings are stored locally and re-generated as required. This minimises the amount of information that must be stored and transferred across the network, but still allows people to have a similar experience on any computer.

Administrators may not be keen on staff having so much freedom when it comes to customising their computers, and for that reason there are policy settings that exist to allow particular systems and users to be locked down.

A locked-down user will be given the same standard interface when they log on and they will not be able to change any of the settings, which reduces the risk that they will change something they shouldn't.

There are some cases where it's not necessary for someone's settings to follow them. The marketing and accounting departments may benefit from mobile user settings, but staff performing data entry tasks may not need such flexibility. Use of Intel-

liMirror depends on the needs of the organisation and its workers.

## An administrator's dream

IntelliMirror's software installation and maintenance capabilities are a godsend to IT administrators. IntelliMirror allows administrators to define the applications that an individual needs without worrying about how the applications will be installed on a machine that doesn't already have them. Administrators can distribute applications in two ways: they can assign them to individuals, or publish them.

Assigned applications are applications that are designated to follow an individual. For example, if everyone on the network is allowed access to a word processor, the word processor can be assigned to everyone. If someone tries to open the word processor on a workstation that does not have it, IntelliMirror finds the location of the installation files from Active Directory and installs it.

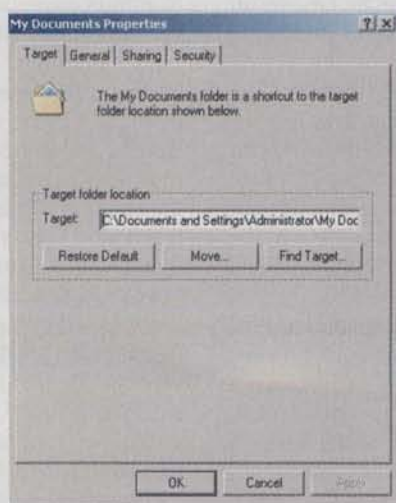
Publishing an application makes it available to all, but individuals decide whether to install the application. These applications are available from the Control Panel's Add/Remove Programs applet.

Most of the applications assigned to individuals or published are installed by the Windows Installer, also known as Microsoft Installer (MSI). Traditional setup.exe routines are still supported, but Windows Installer is a more efficient and intelligent method for installing applications, and a key component

of IntelliMirror's installation and maintenance routines.

Software installation performed under Windows Installer starts with the reading of an MSI file. This file tells Windows Installer which files to copy, registry entries to add and shortcuts to create.

Applications installed with Windows Installer also have self-healing capabilities. This means that administrators don't have to worry about applications not run-



▲ You can easily change the My Documents target folder.

## Windows shareware

### Adobe Acrobat 5.0.1

This is the latest version of this popular document viewer.

### Equill 3.0

Edit Web pages from within your browser.

### GoZilla 3.9.3

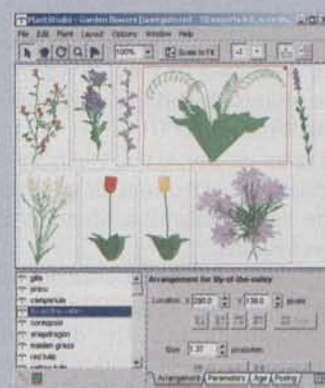
This program provides a reliable way to schedule your downloads.

### PhotoJam 2.0

Combine photos and music to create amazing multimedia presentations.

### PlantStudio 2.01

The green-thumbed will find this plant illustration tool fascinating and addictive.



These programs and others can be found on this month's cover CD, along with more detailed reviews.

ning properly if they become corrupted or if someone inadvertently deletes a required file. Applications can ask Windows Installer to determine whether any program files are damaged or missing. If so, the tool can repair the program by replacing corrupted or missing files. To repair missing files and correct registry entry problems manually, all you have to do is select Detect and Repair from the application's Help menu.

Kieran McNamee



# Leaning towards the right

**W**indows has a real advantage over the Mac: a mouse with two or three buttons. Taking advantage of this, most Windows applications now have pop-up, context-sensitive option boxes for when the right mouse button is pressed, which saves you having to comb menus to find the action you want.

The options that appear in the right-click context menu are largely determined by the applications you use. Very few people know how to add their own choices to the menus, but it can be done. You can



customise your Windows desktop to give you many more time-saving options when you right-click on a file.

In Windows, right-click context menus are associated with particular file types. This means that any file of a particular type can be acted upon using the relevant options. To set these options, open any file folder in Explorer and choose View, Folder

Options (in Windows Me it's Tools, Folder Options). Then click on the File Types tab to bring up the list of registered extensions and the applications they're associated with. If you select one and click on the Advanced button, you get the Edit File Type dialog box, which has all the relevant actions listed in the Actions folder.

To create a new action, click on New and enter the name of the action, along with the application you want to use to execute it (you can use Browse to locate the application visually). In figure 1, the system is configured to play WAV files using Windows Media Player, but an Edit option is being created so that files can be edited using Cool Edit 2000 if required. By placing an ampersand (&) before a letter in the Action dialog box, the option can be selected by pressing that letter on the keyboard.

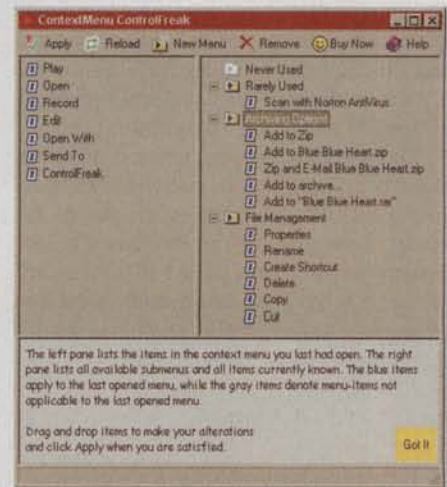
Be sure to append the code %1 after the name of the application. This instructs Windows to pass the current filename to the application it calls. You can also determine which action is executed when you double-click the file (indicated in the dialog using bold-faced text). Highlight your choice and click on Set Default. Click OK, then exit the dialog. When you right-click on that type of file, the option to perform the action you choose will now come up.

Windows Me has improved the Open With right-click menu, which allows you to choose to open a file with any of the applications that have previously laid claim to that file type. You can also add your own, using Open With, Choose Program.

Right-click options can be a major timesaver for people working with large numbers of files. If you've installed more than a few file-related applications, you may find your right-click menu becoming crowded with options you don't really use that often. If so, consider trying out one of several applications that allow you to manage right-click menus more intuitively.

One nice little tool is HACE ContextMenu ControlFreak, a tiny add-on that appends itself to every right-click menu. If you'd like to cut down the size of your right-click menus, load ControlFreak, locate a file of the type that is causing the offending bulk, right-click and select ControlFreak.

Don't let your right mouse button go to waste; it's easy to customise.

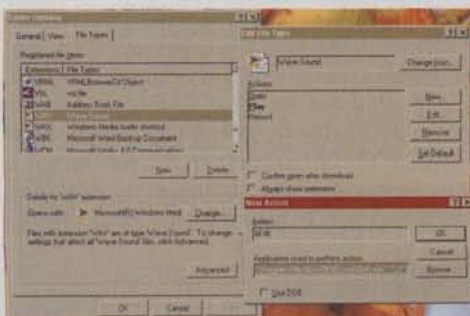


▲ Figure 2: ContextMenu ControlFreak provides an intuitive interface for organising right-click items.

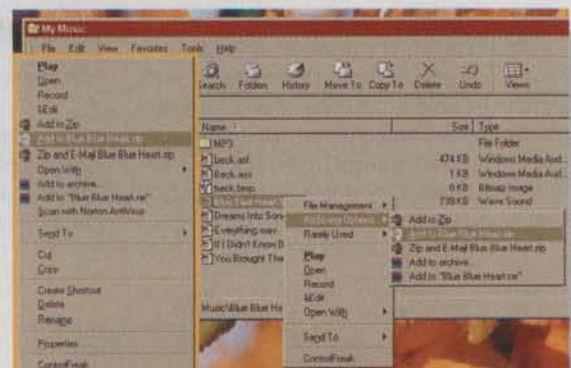
This will bring up a two-paned window with a list of all possible actions for that file on the left-hand side and several folders on the right. Drag and drop related options from left to right, adding new folders as necessary, and after saving your changes, you'll see that ControlFreak neatly organises those options into a number of submenus.

Another HACE application, Out Of Context, allows you to choose from over 75 pre-built right-click extensions to customise your environment further. The software can be found at [www.hace.us-inc.com](http://www.hace.us-inc.com) or on this month's cover CD. Registering ControlFreak costs \$US14 and Out of Context is \$US24.

David Braue



▲ Figure 1: Add new actions to your right-click menus in Windows Explorer.



▲ Figure 3: ControlFreak makes a cluttered right-click menu (inset) far more intuitive.

David Braue can be contacted at [david@braue.com](mailto:david@braue.com).



Advanced CVS commands offer powerful control over multiuser files.

# Same difference

Last month, this column introduced you to CVS, the Concurrent Versions System. This month concludes the coverage of CVS and revision control systems in general with a few practical CVS commands.

To see the differences between two revisions of a file, you can use the CVS command `cvs diff`. This is the equivalent of the `rcsdiff` command for the Revision Control System (see APC June, page 140) and many of the switches work in the same way. For example, you can use the `-r` switch to see the differences between two revisions.

```
cvs diff -r1.2 -r1.4 myfile
```

It can also be used to see the differences between a version in the repository and the version in your working directory.

```
cvs diff -r1.2 myfile
```

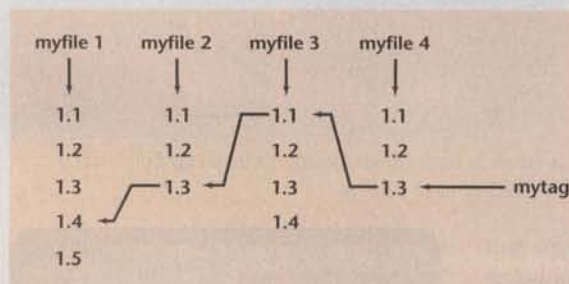
As with RCS, if you don't specify any `-r` switches, the version in your working directory will be compared with the version in the repository that it was based on. This is particularly useful before checking in a file, to see the changes you've made.

```
cvs diff myfile
```

Other diff options, such as `-c` and `-u` (which specify the output format), are supported.

Last month, we mentioned that CVS can work on whole directory trees at once. If you don't specify a filename, running `cvs diff` will show you the differences between all files in your working directory and their corresponding files in the repository.

Once you've committed more than a couple of revisions to the repository, you'll want to be able to see a list of revisions and the comments you entered. To do this, use the `cvs log` command. The output from this command is identical to the RCS `rlog` command (see APC May, page 135).



▲ Figure 1: Visualising a tag applied to a number of files.

## Tagging files

CVS has tags, similar to the RCS symbolic label feature, which allow you to identify revisions with names instead of numbers.

Tagging is most often used on software projects when a public release of the software is made, so that there is a record of which revisions of each of the files made up that release. As with RCS, it is important to remember that the revision numbers are automatically generated by the system



and don't have any relationship to the version or release numbers you may assign.

To tag a file with CVS, you use the `cvs tag` command, with the tag name as a command-line argument. If you want to tag only a particular file, you can specify its name after the tag name, but by default, all files in the directory and its subdirectories will be tagged.

```
cvs tag release-1-2
```

Figure 1 shows one way of visualising a tag applied to a number of files. The 'mytag' tag was applied to revision 1.4 of myfile1, revision 1.3 of myfile2, and so on.

After the tag was applied, revision 1.5 of myfile1 was created, and revisions 1.2, 1.3 and 1.4 of myfile3 were created.

When naming a tag, you can only use letters, digits, hyphens (`-`) and underscores (`_`), and it must start with a letter. In particular, you cannot use a full stop (`.`) in your tag name, to avoid confusion with revision numbers.

Since the `cvs tag` command is used for tagging revisions of files that already exist, it operates directly on the repository and you don't need to type `cvs commit` for the changes to take effect.

By default, the `cvs tag` command will put a tag on the revisions in the repository that correspond to the revisions you have in your working directory, but if you want to tag a different revision, you can use the `-r` switch. For example, use the following command to tag revision 1.3 of myfile.

```
cvs tag -r1.3 release-1-2 myfile
```

To go back to an older revision of a file, you can use a variation of the `cvs update` command. For example, to get revision 1.2 of myfile, you would type the following command.

```
cvs update -r1.2 myfile
```

If you have uncommitted changes to myfile, CVS will attempt to merge those changes into the revision you have selected. Unless you particularly want this, it's a good idea to commit or undo those changes before getting out an older version. If you want to abandon your changes, you can simply remove the file and `cvs update` will recreate it.

You can also specify a tag in the same way as a revision number.

```
cvs update -rrelease-1-2 myfile
```

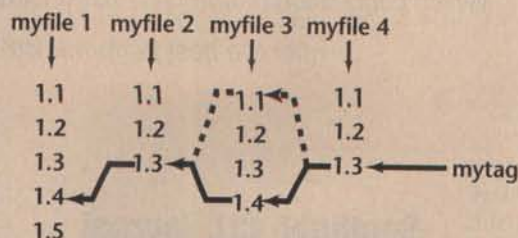
If you have previously tagged every file in your directory (as in figure 1), you could omit the filename from the `cvs update` command and CVS will retrieve the revision of each file that corresponds to that tag. Using `cvs update` in this way allows you to jump back to a previous revision of your project easily.

It is important to note that, when using the `cvs update -r` command, CVS will remember the revision or tag you selected for that file (or files) so that a later `cvs update` (without `-r`) won't replace your files with the latest revision. This is called a 'sticky tag', and you can remove it by using the `-A` switch; for example, `cvs update -A`.

## Moving tags

Once you've added a tag, it is generally a good idea to leave it there. For example, if you have released version 1.2 of your soft-





▲ Figure 2: Moving a tag to a different revision

ware and you tagged each file with the name release-1-2, then moving a tag would make it impossible to figure out which revisions of your files actually went into that release.

That said, if you have made a mistake, you'll need a way to fix it. To remove a tag completely, use the `-d` (for delete) option.

```
cvs tag -d release-1-2
```

If you want to move a tag, you can remove it and then re-add it, but you can also do it in one step with the `-F` switch. For example, to move the tag `mytag` on the file `myfile3` to revision 1.4, you would run the following command.

```
cvs tag -F -r1.4 mytag myfile3
```

Figure 2 shows the effect that this command would have on the files shown in figure 1.

CVS has a very useful feature that can automatically put the revision number inside your files. To use this feature, just place the special string `$Revision$` in your file (the dollar signs and the capital R are important), and then every time the file is committed, that string will be changed to `$Revision: 1.4 $` (with whichever revision number is appropriate).

The replacement of `$Revision$` is a case of 'keyword substitution'. There are a number of other keywords that you can use, such as `$Author$` (the username of whoever last committed the file), `$Date$` (the date and time the revision was committed), and `$Id$` (information including the filename, revision number, date/time and author).

Below is an example of an expanded `$Id$` keyword.

```
$Id: myfile,v 1.4 2001/05/14 17:45:28 g
Exp $
```

## Using binary files

Binary files can be placed into CVS, but you do lose some of the benefits of using CVS and there are a few issues to deal with.

The first is that you need to turn off keyword substitution for binary files, because the string `$Id$` could just coincidentally appear within a file, and when it is expanded, the file will be corrupted.

To turn off keyword substitution, you need to use the `-kb` switch when initially adding a file to CVS with `cvs add`.

```
cvs add -kb my-binary-file
```

If you forget to turn off keyword substitution before committing the file, you can run `cvs admin -kb my-binary-file` followed by `cvs update my-binary-file`. Provided you haven't done any further commits, this will fix the file.

Another problem with binary files is that one of the main features of a revision control system is the ability to see the differences between two revisions, and unless you have a diff program equivalent for your type of binary file, this won't be possible. The comments entered when committing a file can be a partial substitute for this, but then you are relying on people to write informative comments, and the only way to actually verify the changes is to compare the two revisions visually.

The final problem concerns merges. CVS doesn't require people to take out exclusive locks on files, so if two people modify the same file at the same time, a merge will be required. To get around this you can use exclusive locks, but support for this isn't well integrated in CVS. For further information about this, see the 'Multiple developers' section of the CVS manual.

If you decide you no longer want a file, you can remove it with the following steps.

```
rm myfile
cvs remove myfile
cvs commit myfile
```

Although the file has gone from your working directory, CVS keeps the file in the repository, so if you need to go back to any revision of that file, you still can. To try this out, you could follow the above steps to remove a file, type `cvs update -r1.1 myfile` to retrieve the file, and then run `cvs update -A myfile`, which will remove the file from your working directory.

Directories can be created in CVS by using the standard Linux `mkdir` command, and then telling CVS about it with `cvs add`. Unlike adding a regular file, you don't need to commit a directory creation.

## Linux shareware

### AviFile 0.6

This is a player for a variety of video formats, many of which have been unavailable on Linux.



### Gnome Transfer Manager 0.49

A specialised downloading application, especially useful for users with slower connections.

### Powertweak 0.99

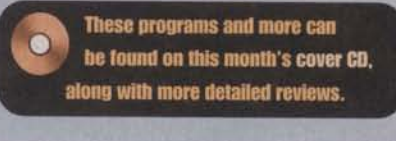
This system tuning tool is based on the Windows product but redeveloped for open source.

### SmsSend 2.6

Capable of sending text messages to mobile phones, this service uses free Web to SMS services.

### XawTV 3.43

This video-capturing application can function as a television viewer or Web cam monitor.



After you've created a directory, anyone else who has the repository checked out will need to run `cvs update` with the `-d` switch if they want to see the contents of that directory. Without the `-d` switch, CVS will only update the subdirectories that already exist in their working directory.

Geoffrey Bennett

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For a complete archive of APC Linux columns, see [apcmag.com](http://apcmag.com).



Which connection methods for handhelds  
offer the best performance?

# A syncing feeling

One of the key success factors for Palm, Windows CE and Psion handheld computers is their ability to expand functionality and share information by connecting to a desktop PC or Mac. However, synchronisation speeds for handheld devices vary according to the connection methods used.

Years ago, Apple reached a milestone in the history of mobile computing by producing the Apple Newton, one of the first mass-market handheld devices. One of the biggest drawbacks of the Newton was its lack of good PC or Mac connectivity. It was the most versatile and flexible mobile computing device on the market at the time, but its lack of good desktop connectivity played a big part in its demise.

In contrast, Palm PDAs excel in the marketplace, partly due to their excellent desktop connectivity. The openness of their conduit and data transfer methods make writing applications for synchronising and transferring information to and from the Palm easy. Similarly, Windows CE/Pocket PC has good desktop connectivity and an open platform, both of which make it easy for developers to extend the functionality of their programs with desktop PC connectivity.

Some find the built-in synchronisation tools rather limited, but products such as Pumatech's Intellisync ([www.pumatech.com](http://www.pumatech.com)), Extended Systems' XTNDConnect ([www.extendedsystems.com](http://www.extendedsystems.com)) and Starfish's TrueSync ([www.starfish.com](http://www.starfish.com)) allow more control over what and how you sync your data on your Palm, Pocket PC, Windows CE or Psion (Epoch) PDA.

## Sync methods

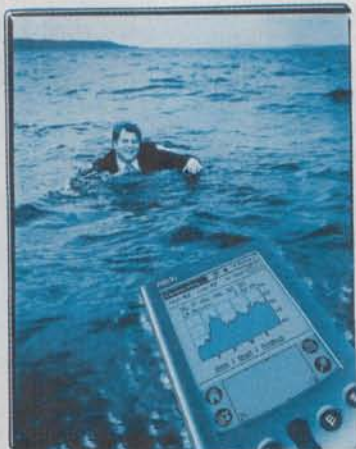
Data synchronisation and application installation is possible through serial, infra-red, dial-up modem, network and USB connection, depending on the equipment you own. Basic Palm systems can connect through infra-red, serial and dial-up modem connections. Network connection is not currently available, and

USB connectivity has just been introduced in Australia with the release of new Palm OS-based PDAs from Handspring and the Palm m500 and m505. All these PDAs offer true USB connectivity which in return provides improved speed.

Over a year ago, Palm released a USB connection kit for its devices. All Palms presently on the market have a serial connection that allows a theoretical maximum connection speed (with OS 3.3 and higher) of 115,200bps. However, this speed is rarely reached. It's a little like trying to ride a pushbike on the freeway. The limit may be 100 kilometres an hour, but there's no way you'll ever reach that speed. The kit is basically a USB to serial converter, and mainly benefits those with Macintosh computers who don't have serial connections, or PC users who have used up all of their serial ports. It offers no real speed increase.

Pocket PC and older Windows CE devices typically support traditional serial and infra-red connectivity, and can handle a network card if speed is critical. Many devices, such as the Hewlett-Packard Jornada 54x and 720 series, come with USB cables as standard, but they are also limited to the 115,200bps serial connection built into the PDA hardware. Newer Pocket PC devices, such as the Compaq iPaq, offer true USB connectivity and take noticeably less time to transfer information than models that connect through serial or 'mock' USB connections.

There are literally dozens of tests that can be done to show when USB is faster than serial and by how much, but in the interests of saving space, a few comparisons have been compiled based on the average use of a PDA. Before drawing conclusions from the results, it's important to consider the areas in which you can expect to see a significant improvement. Activities that don't require much processing or don't use Net access usually show the most dramatic improvement. Restoring data from full backups and programs fall into this category.



## Spotlight: CLC Journal

If you've ever tried to keep track of your contacts with the built-in applications in your Pocket PC, you'll know that it's very frustrating. However, the commercial program CLC Journal changes all that. It allows you to track, sort and organise all correspondence with the contacts in your address book. If you select the contact you want to call, hold the stylus down and opt to create a new entry, it integrates with your address book program.

You can enter information into 12 fields: subject, date, time, priority, sensitivity, duration, type, company, category, multiple contacts and text note. It even has a built-in timer to track the amount of time you spend on each task. Best of all, it synchronises fully with the built-in journal in Microsoft Outlook. This means you not only have the ability to keep better track of your contacts, but you can keep this information up to date with your desktop PC.

The program allows you to customise your views to match different criteria and search for information with ease. However, unlike Microsoft Outlook, it doesn't allow you to go to your address cards and see every entry for each contact in a neat summary. Features such as this require a rewrite of the built-in Pocket Outlook address program, and can be managed with little difficulty through the custom view screens.

To access the Outlook Journal feature, left-click on the toolbar to the right of the option labeled Outlook Shortcuts. From here, the Journal folders appear. You might want to left-click on the Journal item and drag it to your Outlook Shortcut bar for easy access. Once you've done this, left-click on the Journal menu. Outlook then asks you if you want to activate it. Click Yes and select the options you would like to track. You can create a new journal entry from this screen, or go to your contacts view, right-click on the contact you want to call or track, and select the New Journal Entry from Contact menu item.

**Program** CLC Journal

**Company** Crown Logic Corporation

**Online** [www.crownlogic.com/products/journal/j4pkt.htm](http://www.crownlogic.com/products/journal/j4pkt.htm)

**Price** \$US39.95



## USB AND SERIAL SYNC TIMES (m:s)

	Palm m500 (USB)	Palm IIIc (serial)
Initial data sync	1:22	1:52
HotSync (no change)	0:10	0:13
Added 1.2M of data	0:36	2:36
Added new application entries	0:14	0:21
Backup Buddy full backup	1:03	7:13
Backup Buddy full restore	5:04	17:23

Conversely, syncing your AvantGo data isn't much quicker, as the bottleneck is located in your Internet connection, not in the connection to your Palm or Pocket PC. Synchronising a couple of dozen calendar, contact, note or task changes isn't significantly faster either.

The tests (results are shown in the table above) were conducted using a Palm IIIc and a Palm m500, starting only with the pre-installed software. The desktop PC was a 500MHz Pentium III with 512M of RAM running Windows 2000 Professional. Using identical data, a HotSync was performed to each, and identical sample applications and data of various sizes were installed to approximate average daily use. The standard desktop synchronising software that comes with the m500 unit was used and was synchronised to Outlook 2000 rather than the Palm desktop 4.0 software.

To set the units tested to their factory default settings, the Palm stylus was removed and the top of the stylus unscrewed. The data could be removed by inserting the fine tip into the reset button while holding down the on/off button for about 10 seconds, then releasing the reset button.

In the first test, a new Palm m500 and IIIc were loaded with data from Outlook 2000. The test began with 331 contacts, 617 notes, 17 tasks and 1,014 appointments. This test involved a data dump rather than a data synchronisation, so it went rather quickly on both systems. The Palm IIIc took one minute and 52 seconds, and the Palm m500 came in at one minute and 22 seconds. The time difference wasn't significant, because much of the task involves heavy processing on the part of your PC and Pocket Mirror, and is less dependent on the speed of communications.

Once all of the data on the two devices was identical, another HotSync was performed with no change to the data. Again, the time difference wasn't significant; the IIIc came in at 13 seconds and the m500 clocked 10 seconds.

Next, a few programs and some data were added to each Palm to see how they performed. The Palm Reader (130K), Photo Suite Mobile Edition (115K), TealMovie (57K), a TealMovie demo file (472K) and an eBook that's entitled *The\_Hacker\_Crackdown* (439K) were added. It took the Palm IIIc two minutes and 36 seconds to do a standard HotSync and install this data. The Palm m500 performed the same tasks in a mere 36 seconds. This is the kind of operation where the power of USB is most evident.

One more test that is relevant to many handheld users is adding or changing data. To measure the speed for this task, 15 new contact, note, task and appointment entries and 20 email messages to be synchronised were all added. The Palm IIIc took 21 seconds to complete the task and the m500 took 14 seconds. Again, the small time difference was the result of the nature of the task; much of the time was spent comparing and updating data on the PC rather than transferring large amounts of data to the PDA.

The final set of tests involved a task many people don't perform on a regular basis, but should seriously consider. A program called Backup Buddy ([www.backupbuddy.com](http://www.backupbuddy.com)) was used to perform a full system backup and full system recovery on each device. To ensure an accurate simulation, each PDA was loaded with about 3.5M of programs and data prior to the backup. The time differences for the backup were significant; the Palm IIIc took seven minutes and 13 seconds, and the Palm m500 took only one minute and three seconds. The results of the restore were equally uneven. The Palm IIIc ran up 17 minutes and 23 seconds, but the Palm m500 took only five minutes and four seconds.

It's important to remember that with data synchronising on either a Palm or Pocket PC PDA, your connection time is always affected by the weakest link. In this case, anything that accesses the Internet (such as AvantGo) can add a lot

## PDA shareware

## HomeLoan

This portable home loan manager is an invaluable tool for anyone looking at loan alternatives.

## InfoDB Tools

A handy tool for your Palm, it can create databases with text, graphics and other information.

## Miniature Golf

This great 3D game for your Pocket PC will provide hours of fun.



## PhoneMate

This address book program provides quick access to your contacts through an easy-to-read display.

## Remote Display Control for Pocket PC

This tool allows you to run programs on your handheld while it's in its cradle, and control them from your PC.

All these programs and more can be found on this month's cover CD, along with more detailed reviews.

of time to the process. However, you can finetune these settings by reducing the amount of content you pull down and by setting the frequency of data downloads, as outlined in a recent column (see APC May, page 133).

Ronald Rosenbaum

Ronald Rosenbaum can be contacted at [ron@ats.au.com](mailto:ron@ats.au.com).



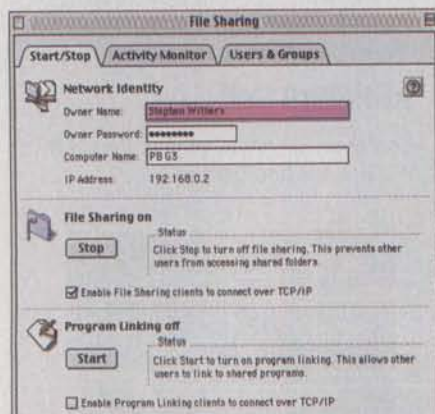
For a complete archive of APC PDAs columns, see [apcmag.com](http://apcmag.com).



How do the new networking features in  
Mac OS X measure up?

# Networking: the X-rated guide

Once Mac OS X is up and running, many people's thoughts will turn to networking. The basic Internet configuration is handled by the installation process, but there are several networking issues to consider.



▲ If you don't enable file sharing over TCP/IP, a system running Mac OS 9 won't be visible to another system running Mac OS X.

## AppleShare

AppleShare is still part of the system software, but Mac OS X only connects to AppleShare servers (that is, servers offering AFP services or Macintoshes using File Sharing) through TCP/IP, not over AppleTalk.

If you want to maintain 'any-to-any' connectivity on your Macintosh LAN through File Sharing, you need to run Mac OS 9 or X on all your Macs. Versions prior to 9 only support AppleShare over AppleTalk, but 9.x supports AppleShare over both AppleTalk and TCP/IP.

To activate File Sharing over TCP/IP, open the File Sharing control panel in Mac OS 9, and tick the box labelled 'Enable File Sharing clients to connect over TCP/IP'. If the File Sharing feature isn't already running, click the Start button then close the File Sharing control panel.

If you are running Mac OS 9.0.x, the computer may stall for a couple of minutes when you first open this control panel, and again when you activate File Sharing over TCP/IP. You just have to wait, or upgrade to 9.1, which removes this bug.

On other servers such as AppleShare IP, make sure that the appropriate services are enabled over TCP/IP by following the manufacturer's instructions.

Some software might not support AppleShare over TCP/IP, in which case

you will have to look for another way of connecting.

If you can't or don't want to upgrade some of your systems to Mac OS 9 or X, don't worry. Although you can't connect from Mac OS X to most other versions, the process works in reverse as long as you enable AppleTalk on the Mac OS X system first. To do so, select the Network panel in System Preferences, and choose the appropriate network interface (probably Built-in Ethernet) in the Configure pop-up menu. Next, select the AppleTalk tab, tick the box next to Make AppleTalk Active, and click Save. Now click Show All in the toolbar and then click the Sharing icon. (If you've added Sharing to the System Preferences toolbar, click it there instead.) If File Sharing is already running, click the Stop button and wait for it to stop.

Finally, click Start, wait for File Sharing to start up, then close System Preferences. Your computer doesn't broadcast its name (and therefore doesn't show up in the Chooser under Mac OS 9.x or earlier versions) until File Sharing starts up; hence the need to stop and restart if it's already running.

To connect to an AppleShared volume or folder from Mac OS 9 or an earlier version, use the Chooser in the normal way, regardless of the OS the server computer is running. In Mac OS 9, you can use the Network Browser instead; look for the server in the AppleShare neighborhood.

Under Mac OS X, choose Connect To Server in the Finder's Go menu, then browse for the server you want. Remember, you'll only see servers running AppleShare over TCP/IP, which excludes those running File Sharing on Mac OS 8.x and earlier versions.

## SMB/CIFS

Connecting Macintoshes and Windows PCs in a 'natural' manner used to require relatively expensive software such as DAVE or PC MacLAN. Thanks to Mac OS X's Unix foundation, the open-source Samba software popular with Linux users to provide Windows connectivity was easily ported to Apple's new operating system.

A precompiled Samba for Mac OS X (Samba X) together with a Mac-style installer created by Derk-Jan Hartman (xamba.sourceforge.net) can be found on this month's cover CD. To install, expand the archive using StuffIt Expander or similar, double-click the .dmg (disk image) file



▲ Mac OS X's File Sharing might be active, but that computer won't be visible to Mac OS 8 clients unless you enable AppleTalk.

to mount it, and then open the Samba.pkg file to start the installer. Follow the instructions to get Samba up and running.

The package includes SWAT (Samba Web Administration Tool), which lets you manage Samba from the comfort of your favourite Web browser instead of having to edit the configuration file. In the Address field of the browser, type in 127.0.0.1:901. You'll be asked for the root password.

It's a good idea to bookmark SWAT to save having to remember the numeric address. Take some time to explore later, but for now, click the Globals icon at the top of the page and set the Workgroup and NetBIOS names. The Workgroup should be the same on all the computers on your network, but the NetBIOS name should be unique.

After entering the names, be sure to press the Commit Changes button. These settings don't take effect until you restart the Samba server, so click the Status icon and press the Restart smbd and Restart nmbd buttons. (smbd is the Samba server itself, and nmbd is the NetBIOS name server).



Your Mac OS X system should now be visible in the Network Neighborhood or My Network Places of the Windows PCs on the LAN. If not, check that you set the workgroup name correctly and that the NetBIOS name really is unique, and restart `smbd` and `nmbd`. Still no luck? One possibility is that the Windows PCs have the relevant services bound to a protocol other than TCP/IP (for example, NetBEUI). Consult someone with Windows networking expertise if necessary.

Once your Mac is visible to Windows, you still need to set up a shared folder. This is where things can get messy, because you need to specify the path to the folder in the Unix style, and the Unix directory names aren't necessarily the same as the folder names. You can avoid that problem by only sharing folders within users' home folders. To illustrate, create a folder called Shared in your home directory and share it through Samba. Open a Finder window, and click the Home icon in the toolbar. Choose New Folder from the File menu, or type Command-Shift-N. Without first clicking the mouse or pressing the Enter key, type the desired name, in this case Shared.

Open SWAT in your Web browser and click the Shares icon. Type the name you want to give the share into the box next to the Create Share button, and then click the button.

The resulting form allows you to adjust many settings for this share, but the only one you really need to change is Path (the second one down). Type in the pathname for the folder you're sharing: in our example, it's `/Users/username/Shared`, where username is replaced by your short-form username. Click the Commit Changes button to make the change.

Other parameters may need changing, but this is enough to let you copy files from Windows to your Mac.

The other side to Mac/Windows file sharing is the ability to mount SMB/CIFS shares under Mac OS X. This can be achieved with a program called Sharity (see this month's cover CD) from Objective Development. This is commercial software, but the company grants a single-client, single-server licence to home users at no charge, and students can apply for a free two-client, two-server licence. Licence fees range from \$US59 for a two-client, unlimited server version for home users, to \$US9,500 for a commercial site licence. Installation is straightforward, but there are separate versions for Mac OS X and Mac OS X Server, so be sure to use the right one.

Once Sharity is running, it is practically transparent. If you look in the Finder's Network folder (which you can open by clicking the Network icon in a Finder window's toolbar), you'll see an icon labelled CIFS. Double-click it, and the resulting window is the equivalent of Windows' Network Neighborhood: all the CIFS/SMB servers on the LAN show up there. Just drill down through the folder hierarchy and use files as normal.

However, there is a problem with Sharity under Mac OS X: a bug in the Mac OS X kernel prevents shares from being unmounted, and the Finder tends to hold files open on mounted shares. This sounds more serious than it is, but if it does affect your use of Sharity, you'll find a workaround on Objective Development's Web site ([www.obdev.at/products/sharity/kernel.html](http://www.obdev.at/products/sharity/kernel.html)).

## Firewall

Personal firewall products from companies such as Symantec and Intego are gaining popularity, but as yet, the firewall in Mac OS X has not received much attention.

This is largely because the firewall is hidden away in the Unix underpinnings. Even if you know it's there, it isn't the kind of thing the average Macintosh user would be comfortable configuring. Just as SWAT saves Samba users from editing configuration files, BrickHouse (shareware, \$US25; see the cover CD) puts a more familiar interface on the firewall. You can also view the documentation for configuring the firewall in the Unix manner by opening a terminal window and typing `man ipfw`.

The firewall has also received little attention because the default configuration lets everything through. Some security specialists might argue that this is inappropriate, but a 'deny everything' default would cause problems due to the low profile of the firewall — if you don't know it's there, how do you know the firewall is stopping traffic for an Internet program you are trying to use?

As you can see from the screenshot, BrickHouse provides a 'tick the box' configuration window. However, it's a good idea to take some time to read the documentation.

There are separate panels for Ethernet and PPP connections. This is especially useful if your Mac is on a home LAN but you connect to the Internet via a modem. For example, you can enable SMB/Samba over Ethernet but not through the modem, to stop outsiders from snooping through your shared folders. If you have a network

## Mac OS shareware

### FoldersSynchronizer 2.1.2

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### Interarchy 4.1

The Mac's best-known FTP client is updated for Mac OS X.

### Macintosh Explorer 2.0

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### Palm Desktop 2.6.3

This is one of the best Personal Information Managers for the Mac.



### Pepper 3.6.4

Ported from BeOS and further improved, Pepper is a superior text editor for Mac OS X.



These programs and more can be found on this month's cover CD, along with more detailed reviews.

connection to the Internet (for instance, a cable modem connected through a hub), AppleShare and SMB/CIFS can 'leak' out of your LAN, presenting a distinct security risk unless your router or external firewall is configured to prevent this from happening. Use the Expert mode in BrickHouse if you need to configure the firewall for an additional Ethernet interface.

Remember that clicking BrickHouse's Apply icon only changes the firewall rules temporarily. If you want to make your current settings permanent, be sure to click the Install icon.

Stephen Withers



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Structures can make life easier when working with binary files.

# Structured learning

Last month, this column discussed the workings of binary files. This month, Practical C++ puts your hard-earned knowledge to practical use. Having grasped the concept of binary files, you can now analyse your code.

To allow you to change between binary and text modes without any changes to the CRoll (other than the modification of the constant) a change has been made to last month's program. Instead of hard-coding the binary open mode (as in listing 1), a constant is defined — `m_openmode` — and used instead (see listing 2). The constant is defined by declaring a const object in the CRoll class (see listing 3) and initialising it in the constructor (see listing 4).

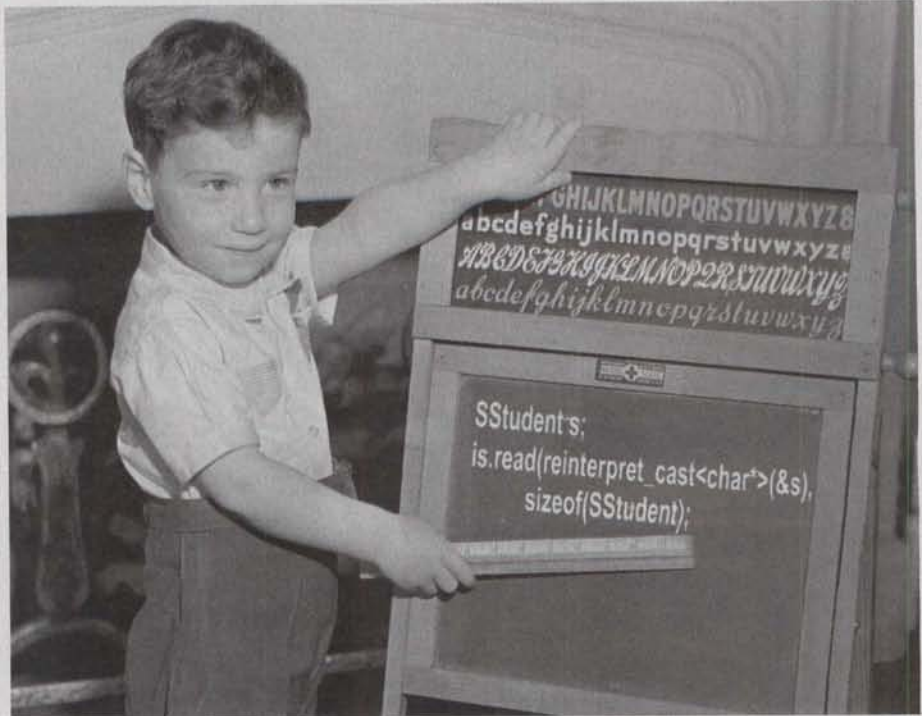
To write your data to a file in binary format, you need to define the structure `SStudent` (see listing 5). But what is a structure, or struct? Let's start with what it is not.

C++ is a descendent of the C language. A C struct is simply a collection of data. It doesn't always have methods; only data members. It doesn't have encapsulation or data hiding; all members are public. The public/private/protected keywords are not supported and there is no inheritance.

In C++, a structure is almost identical to a class. It can have both data members and methods. It can also have both public and private members. It may even involve inheritance.

Whether you use a structure or a class is largely a matter of taste and style. In Practical C++, structures are used just like C structures; no methods or private data are allowed. This probably reflects my background and prejudices more than any real design considerations, but it seems to work.

The `CStudent` class contains data members and methods (see the example code). If the whole class is written to a binary file, the data is written along with other elements such as function pointers. Many of these elements should not be stored. To avoid this, define the `SStudent` structure. Before writing to file, copy all of the data into an `SStudent` structure, then write the structure to the file. When reading the data back, read into the structure, then copy the data into the `CStudent` class. See listing 6 for this code.



The `SStudent` class uses arrays of characters to store the character strings, rather than the `std::string` class used by the `CStudent` class. This is necessary so that string objects aren't written to the file. However, it introduces a problem. String objects automatically resize themselves, so they can hold any size of data string, but the size of the character arrays are fixed. If you try to store a string in a character array that is too short, you get what is known as a 'buffer overrun'. This means that you've written past the end of the buffer into whatever memory happens to be next. This is not a good thing. It can corrupt data, crash the program or worse.

Before you copy the strings into the character arrays, you must check to make sure that the string will fit. This is done in the function `SafeCopy()` (see listings 7 and 8). The `SafeCopy()` function uses the standard C library function `strncpy()`, which copies the string, but truncates it if it is too long. The `SafeCopy()` function uses `strncpy()` to copy the string, then manually inserts a nul (0) character to terminate the string.

The function has been put into a namespace, `StudUtes`, to avoid conflicts.

Large projects often link in many library functions, sometimes from many different sources. If you link to a library that also has a function called `SafeCopy()`, you could encounter all sorts of problems. By wrapping the function in a namespace, you differentiate your function from any other with the same name. It's not foolproof, but it's reasonably safe. In a big project, there are many utility functions, and these should all be put into the same namespace.

The last change to be made to the original program is the addition of a `Print()` method to the `CStudent` class. In the original version, the `Write()` method was used to display a student on the screen.

Now that `Write()` outputs in binary format, it is no longer suitable for that task. To get around this, the `Print` method, which is just like the old `Write()` text mode, is added. Listing 9 illustrates where the old call to the `Write()` method is replaced with `Print()`.

Next month, random access files will be applied to the program. Until then, keep on coding!

Michael Smith



For a complete archive of APC C++ columns, see [apcmag.com](http://apcmag.com).



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## C++ source code Note: Text that appears in *italics* is explanation only, not code.

### Listing 1: Part of Roll.cpp

```
std::ifstream fi(m_fname.c_str(),
    m_std::ios_base::binary);
```

### Listing 2: Replacement part of Roll.cpp

```
std::ifstream fi(m_fname.c_str(),
    m_openmode);
```

### Listing 3: Part of Roll.h

```
class CRoll {
    The first part of this class is omitted to save space. See Roll.h on the
    cover CD.
private:
    const std::ios_base::openmode m_openmode;
```

### Listing 4: CRoll constructor from Roll.cpp

```
CRoll::CRoll(const std::string &fname)
: m_fname(fname)
, m_openmode(std::ios_base::binary)
{
    Read();
}
```

### Listing 5: Part of Student.h

```
#include <fstream>
const int LENSTR=128;
const int LENDOB=12;
struct SStudent {
    unsigned
    unsigned m_studNo;
    char m_familyName[LENSTR];
    char m_otherNames[LENSTR];
    char m_address[LENSTR];
    char m_DOB[LENOB];
};
```

### Listing 6: Part of Student.cpp

```
bool CStudent::Read(std::ifstream &is)
{
    SStudent s;
    is.read(reinterpret_cast<char*>(&s),
        sizeof(SStudent));
    m_studNo = s.m_studNo;
    m_familyName = s.m_familyName;
    m_otherNames = s.m_otherNames;
    m_address = s.m_address;
    m_DOB = s.m_DOB;
    return is.good();
}

bool CStudent::Write(std::ofstream &os)
{
    SStudent s;
    s.m_studNo = m_studNo;
    StudUtes::SafeCopy(s.m_familyName,
        m_familyName.c_str(),
        LENSTR);
    StudUtes::SafeCopy(s.m_otherNames,
        m_otherNames.c_str(),
```

```
        LENSTR);
    StudUtes::SafeCopy(s.m_address,
        m_address.c_str(),
        LENSTR);
    StudUtes::SafeCopy(s.m_DOB,
        m_DOB.c_str(),
        LENDOB);
    os.write(reinterpret_cast<char*>(&s),
        sizeof(SStudent));
    return os.good();
}

bool CStudent::Print(std::ostream &os)
{
    os << m_studNo << std::endl
    << m_familyName << std::endl
    << m_otherNames << std::endl
    << m_address << std::endl
    << m_DOB << std::endl;
    return os.good();
}
```

### Listing 7: Studutes.h

```
namespace StudUtes {
    char *SafeCopy(char *dest,
        const char *src,
        int len);
};
```

### Listing 8: Studutes.cpp

```
#include "StudUtes.h"
#include <cstring>
namespace StudUtes {
    char *SafeCopy(char *dest,
        const char *src,
        int len)
    {
        strncpy(dest, src, len);
        dest[len-1] = '\0';
        return dest;
    }
};
```

### Listing 9: Part of Studbase.cpp

```
bool DoFind(CRoll &r,
    int argc,
    char *argv[])
{
    if (argc!=3) {
        Usage();
        return false;
    }
    CStudent s;
    bool rs = r.Find(atoi(argv[2]), s);
    if (rs)
        rs = s.Print(std::cout);
    return rs;
}
```



All these listings can be found on this month's cover CD.



Controlling data structures can be simplified  
with existing Java classes.

# Enumeration nation

**W**e've been looking into abstract data types in Java over the last months. Linked lists, stacks and queues have so far been covered. This month, some new standard Java classes will be introduced.

Java supplies data types such as integers and strings. The data structures dealt with in past columns have been of the 'invent your own' variety. The Java class library provides some data structures which you can draw on when you need help. The classes that provide these structures are contained in the `java.util` package.

## Enumeration

Enumeration is possibly the most abstract and the most difficult class to get a grip on. It is not a class, it is an interface. Therefore, any class can be designed to implement the Enumeration interface.

If a class implements the Enumeration interface, and if the methods of that class are properly designed and coded, an object of that class can be used to enumerate an object of the class for which it was specifically designed.

To enumerate an object is to provide a pair of methods by which a program can do two things:

- Obtain in a sequential fashion (one after the other) all of the objects that are stored in the object being enumerated (actually, what is obtained are references to the objects, but this doesn't matter for our purposes); and
- Obtain (at any point in the process) a Boolean value indicating whether or not there are any more objects to be obtained.

The words "specifically designed" are especially significant. There is no such thing as a general-purpose enumeration object or a general-purpose enumeration class. All enumeration objects are instances of a class specifically designed to enumerate objects of a specific class or data type.

A class that implements the Enumeration interface must provide a definition for the following two methods that are declared in the interface:

```
public boolean hasMoreElements()
public Object nextElement()
```

The benefits of the Enumeration interface become apparent when a class dealing

with sets of objects has the ability to provide an Enumeration object capable of 'walking through' (enumerating) an instance of the original class and its sets.

For example, if an object of a linked-list class has the ability to provide an enumeration object on itself, code within the scope of the linked list object can obtain that enumeration object and use it to iterate through all the nodes in the linked list.

The methods of the Enumeration interface can be invoked on the enumeration object to provide that code with a sequence of references to the nodes in the list. Then, depending on access control considerations, the code can access the individual nodes in that specific linked-list object.



An enumeration object is not really an object of the Enumeration class, because there is no such class. Rather, Enumeration is an interface and it is not possible to instantiate objects of an interface type. However, if an object is instantiated from a class that implements the Enumeration interface, then as far as the two methods declared in the Enumeration interface are concerned, the object can be treated as if it is of type Enumeration.

Unless the class from which the enumeration object is instantiated contains members that are not declared in the Enumeration interface, you really don't need to worry about the class from which it was instantiated. You can always refer to it as type Enumeration.

An enumeration object doesn't normally contain any hard data. It usually contains a reference to the specific object that it was instantiated to enumerate, as well as other data that is necessary for it to execute its two methods reliably. However,

an enumeration object designed to enumerate an object that is a complex data structure may require very complex methods to accomplish its task.

When the `nextElement()` method of an enumeration object returns a reference to an object, that reference is always of the generic type `Object`, and it is normally necessary to downcast it to its true type to do anything useful with it.

As mentioned earlier, an enumeration object can exist only as a partner to another object containing data to be enumerated. In other words, there is no such thing as a useful standalone enumeration object. An enumeration object exists for the sole purpose of providing its methods to enumerate another object of a specific class.

Enumeration objects don't need to be complex. This month's sample program illustrates a simple class that stores String data in an array and a simple enumeration object that can be used to enumerate an object of that class.

The program defines a class (`MyDataStruct`) that creates a simple data structure consisting of an array of String data. The class provides a method that returns an object of a class that implements the Enumeration interface (enumeration object).

The two methods of the Enumeration interface class can then be invoked on the enumeration object to iterate through the original data structure retrieving each data element in the structure. The enumeration object serves as a structured pathway into the object that it was instantiated to enumerate.

One of the two methods of the Enumeration interface can be used to determine if there are any elements in the data structure that haven't already been retrieved. The other method in the Enumeration interface can be used to retrieve the next element.

In this program, the controlling class instantiates an object of type `MyDataStruct`, invokes the `getEnum()` method to get an enumeration object, and uses that object to iterate through the data structure retrieving and displaying each of the elements in the structure.

Next month, we'll move on to Vectors, as provided in the `java.util.Vector` class.

David Williams

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## Java source code

### Listing 1: MyDataStruct.java

```
import java.util.*;

class MyEnumerator implements Enumeration
{
    int count;
    int length;
    Object[] dataArray;

    MyEnumerator (int count, int length, Object[] dataArray)
    {
        this.count = count;
        this.length = length;
        this.dataArray = dataArray;
    }

    public boolean hasMoreElements ()
    {
        return (count < length);
    }

    public Object nextElement ()
    {
        return dataArray[count++];
    }
}

class MyDataStruct
{
    String[] data;

    MyDataStruct ()
    {
        data = new String[4];
        data[0] = "zero";
        data[1] = "one";
        data[2] = "two";
        data[3] = "three";
    }

    Enumeration getEnum ()
    {
        return new MyEnumerator (0, data.length, data);
    }
}

class Enum01
{
    public static void main (String[] args)
    {
        MyDataStruct myDataStruct = new MyDataStruct ();
        Enumeration myEnumeration = myDataStruct.getEnum ();

        while (myEnumeration.hasMoreElements ())
        {
            System.out.println (myEnumeration.nextElement ());
        }
    }
}
```



For a complete archive of APC Java columns, see [apcmag.com](http://apcmag.com).

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Want to track who's visiting your site?

Access and ASP make it easy.

# Somebody's watching me

This month, Insite looks at using an Access database to log page requests on your Web site so that you can generate usage statistics in real time. Along with the database file, two ASP pages are used in this application. The first, *global.asa*, is stored in the root directory of your site and performs all the database logging as visitors come to your site. It's a server configuration file, not an ordinary ASP page, so you don't need to link to it or reference it at all. You just drop it into your site and the server does the rest. The second ASP page, *stats.asp*, is used to collate the data stored in the database and format it so that it reflects patterns of user activity on your site.

All the files you need are included on this month's cover CD, but you need Microsoft Access to view the database and a Web server that is compatible with Active Server Pages (such as Personal Web Server or Internet Information Server) on your computer.

You also need to create a table to store your data in. You can use SQL Server, Microsoft Access or some other ODBC-compliant database, and your table should contain the following fields:

Name	Type	Details
ID	Autonumber	Primary Key
UserIP	Text	
EntryPage	Text	
Referrer	Text	
Browser	Text	
DateTime	DateTime	Default value = Now()

Field Name	Data Type	Description
ID	AutoNumber	Record Identifier
UserIP	Text	User's IP Address
EntryPage	Text	First Page Visited by User
Referrer	Text	Referring Site URL
Browser	Text	The User's Browser
DateTime	Date/Time	Time and Date

▲ Figure 1: The basic database table

Whenever an ASP page is requested from the server, it looks for a valid cookie called *ASPSESSIONID* to see whether this is a new browser session or not. If it is not present, the server sets a new *ASPSESSIONID* cookie to identify the visitor as they move from page to page. By using this cookie to track visitors automatically, the server can determine with each page request whether it belongs to a new or existing visitor.

In addition to creating this cookie when a new session is begun, the server also looks for a file called *global.asa*, and if it exists,

executes a function called *Session\_OnStart*. This function is generally used to set variables and perform other server-side tasks in preparation for a new browser session. However, it can also be used to log available information about the visitor to your database. The four pieces of information you need to focus on are the visitor's IP address, the page the visitor is requesting, the page the visitor just came from (the 'referrer'), and the type of browser being used.

All of this data is available through the *Request.ServerVariables* collection in ASP, as demonstrated in listing 1. For a complete list of available server variables, try using the code in listing 3.

## Logging user requests

Writing visitor data to the database is a straightforward operation. First, a connection to the database is established. Listing 1 shows you how a file-based connection can be made to an Access database without needing to configure a DSN data source in the control panel. If you are using Excel, SQL Server, a text file or an ODBC-configured data source, try one of the following connection strings instead.

### Excel spreadsheets

```
gConn.Open "Driver={Microsoft Excel Driver (*.xls)};" & _
"DriverId=790;" & _
"Dbq=\\somepath\\mySpreadsheet.xls;" & _
"DefaultDir=\\somepath;"
```

### Text files

```
gConn.Open "Driver={Microsoft Text Driver (*.txt; *.csv)};" & _
"Dbq=\\somepath\;" & _
"Extensions=asc,csv,tab,txt;" & _
"Persist Security Info=False"
```

```
strSQL = "Select * From customer.csv", _
oConn, adOpenStatic, adLockRead-Only, _
adCmdText
```

### SQL Server

```
oConn.Open "Driver={SQL Server};" & _
"Server=carl2;" & _
"Database=pubs;" & _
"Uid=sa;" & _
"Pwd=;"
```



### System DSN configured in Control Panel

```
oConn.Open "DSN=AdvWorks;" & _
"Uid=Admin;" & _
"Pwd=;"
```

For more information on connecting to different data sources in ASP, check [www.able-consulting.com/ado\\_conn.htm?f=ado\\_conn.htm](http://www.able-consulting.com/ado_conn.htm?f=ado_conn.htm).

The *global.asa* file logs the information about visitors to your site in real time, so you can view a summary of this data using simple database queries, as shown in listing 2. The SQL statement in listing 2 requests two fields from the database table. First, it requests the referrer information, which contains the URL for the last page visited in the user's browser before coming to your site, and second, the number of times this referrer appears in the database. These records are sorted from the most popular to the least popular, giving you a list of the top referrers.

The variable *showCount*, set at the top of listing 2, is used to set the number of records you wish to see. For example, setting it to 5 gives you the 'Top 5', as shown in figure 2. Figure 2 also demonstrates how the code in listing 2 can be adapted to display top 5 values for entry pages, user IP addresses and browser types, as well as referrer values.

## Further possibilities

In addition to displaying your Web site statistics in 'Top 5' style, you can determine time-based trends by using the *dateTime* field in the database. For instance, you could determine the most popular days of the week using the *DATEPART()* SQL function, or the number of distinct visitor IP addresses using the *DISTINCT()* SQL function. It's also



## Insite source code

### Listing 1: The global.asa page

```
<script language="vbscript" runat=serve>R
Sub Session_OnStart
  strReferrer = Trim(Request.ServerVariables("HTTP_REFERER"))
  if strReferrer = "" then
    strReferrer = "None"
  end if
  Set gConn = Server.CreateObject("ADODB.Connection")
  gConn.open "Provider=Microsoft.Jet.OLEDB.4.0;Data Source=" _
    & Server.MapPath("data/stats.mdb")
  strSQL = "insert into userdata (UserID,EntryPage,Referrer,Browser)" _
    & " VALUES (" _
    & Trim(Request.ServerVariables("REMOTE_HOST")) & ", " _
    & Trim(Request.ServerVariables("Script_Name")) & ", " _
    & strReferrer & ", " _
    & Trim(Request.ServerVariables("HTTP_USER_AGENT")) & ")"
  gConn.execute(strSQL)
  gConn.close
  set gConn = nothing
End Sub
</script>
```

### Listing 2: Data summary for stats.asp

```
<%
showCount = 5
loopCount = 0

Set Conn = Server.CreateObject("ADODB.Connection")
Conn.open "Provider=Microsoft.Jet.OLEDB.4.0;Data Source=" _
  & Server.MapPath("data/stats.mdb")
strSQL = "SELECT count(id) as cid, referrer FROM userData" _
  & " group by referrer order by count(id) desc"
set rsTemp = Conn.execute(strSQL)

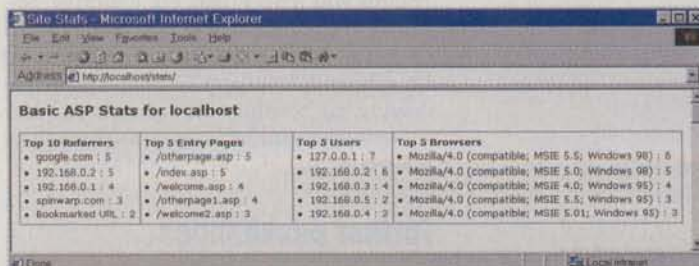
if not rsTemp.eof then
  Do While not rsTemp.EOF and loopCount << showCount
    IF rsTemp("referrer") = "None" Then
      strRef = "<li> Bookmarked URL" _
```

```
      & " : " & rsTemp("cid")
    Else
      strRef = "<li> " & rsTemp("referrer") _
        & " : " & rsTemp("cid")
    End If
    response.write strRef
    rsTemp.MoveNext
    loopCount = loopCount + 1
  loop
end if
rsTemp.Close
Set rsTemp = Nothing
loopCount = 0
%>
```

### Listing 3: Displaying all server variables

```
<TABLE>
<T>R
<TD>
  <font size="2"><B>Server Variable</B>
</TD>
<TD>
  <font size="2"><B>Value</B>
</TD>
</T>R
<% For Each var In Request.ServerVariables %>
<TR valign=top>
<TD><font size="2">
  <%= var %>
</TD>
<TD><font size="2">
  <%= Request.ServerVariables(var) %>
</TD>
</T>R
<% Next %>
</TABLE>
```

For the complete code for all the pages used here, check this month's cover CD.



▲ Figure 2: An example top 5 statistics page

possible to use the query results to draw charts or graphs, using third-party COM objects or dynamically sized HTML elements such as images or table cells.

For more information on SQL statements, check out these links:

- [w3.one.net/~jhoffman/sqltut.htm](http://w3.one.net/~jhoffman/sqltut.htm)
- [www.wdvl.com/Authoring/DB/Intro/basic\\_query.html](http://www.wdvl.com/Authoring/DB/Intro/basic_query.html)

Building graphs with ASP will be covered in a future Insite column, but if you want to jump the gun, try these sites:

- [www.codeave.com/asp/code.asp?u\\_log=87](http://www.codeave.com/asp/code.asp?u_log=87)
- [aspin.com/func/content?tree=aspin/tutorial/graphics&id=2267610](http://aspin.com/func/content?tree=aspin/tutorial/graphics&id=2267610)
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Daniel Potts



For a complete archive of APC Insite columns, see [apcmag.com](http://apcmag.com).



Daniel Potts can be contacted at [daniel@indigointeractive.com.au](mailto:daniel@indigointeractive.com.au)



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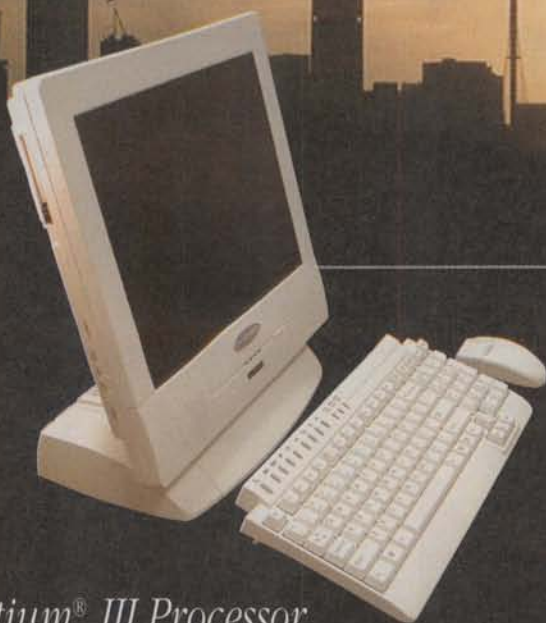




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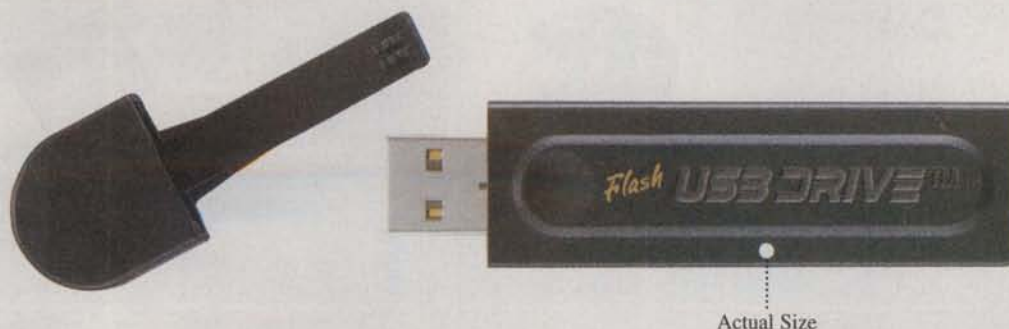
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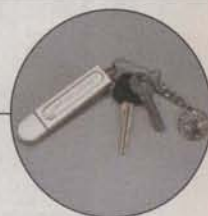
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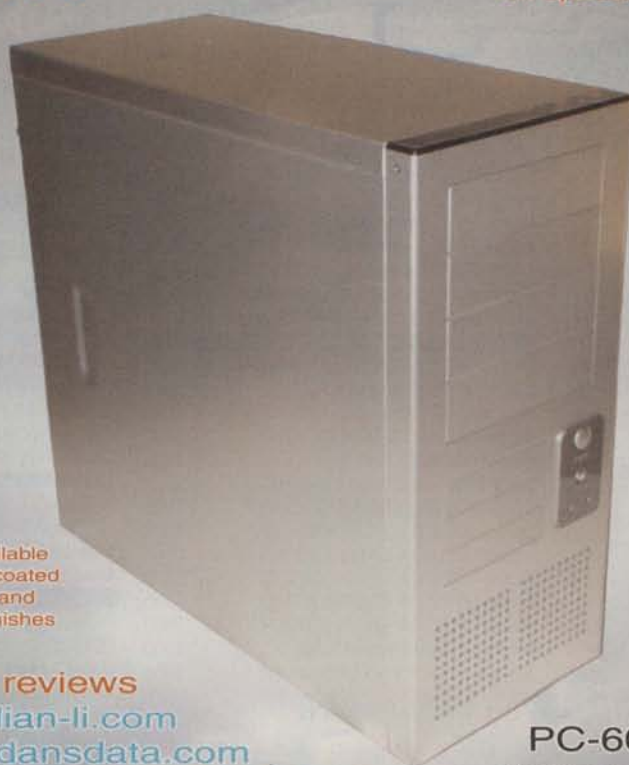
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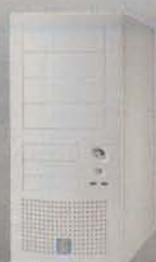


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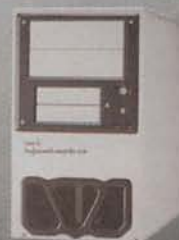
**Mobile Rack Full Aluminium**  
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Celeron 733 \$160		<b>Motherboards</b>		8M SIS AGP or PCI \$55		Stylus 480 \$135		<b>Sound</b>	
Celeron 766 \$170		<b>Pentium II / III</b>		16Mb SIS AGP \$80		Stylus 580 \$158		<b>BLASTER</b>	
Celeron 800 \$180		ASUS CUV-4X-C \$210		16Mb TNT2 / 32Mb TNT2 AGP \$90 / \$95		Stylus 680 \$250		PCI 128 oem \$43	
Celeron 850 \$200		ASUS CUV-4X-E \$245		32Mb TNT2 PCI \$129		Photo 720 \$375		Live oem \$100	
Pentium III 866EB \$375		ASUS CUSL2 \$310		32Mb TNT2 with TV out AGP / PCI \$115 / \$150		Photo 870 \$500		Live DE 5.1 \$175	
Pentium III 933EB \$417		ASUS CUSL2-C \$240		32Mb TNT2 with TV out video in AGP \$180		Photo 890 \$560		Live Platinum 5.1 \$420	
Pentium III 1GHz \$445		ASUS CUSI-M \$165		Matrox G450 32Mb Dual head AGP \$320		Photo 1290 (A3) \$909		<b>Memory</b>	
P4-1.3Gb \$595		<b>GIGABYTE</b>		<b>ASUS</b>		<b>Canon</b>		64Mb SDRAM \$35	
P4-1.4Gb \$644		GA-6VXC7-4X-P \$165		V7100 GeForce II MX 32Mb with TV out \$220		BJC1000SP \$107		128Mb SDRAM \$55	
P4-1.5Gb \$794		GA-60XE-1 \$215		V7700 GeForce GTS 32Mb Deluxe, DDR \$460		BJC 2100SP \$137		256Mb SDRAM \$100	
<b>AMD</b>		GA-60XE \$235		V7700 GeForce GTS 64Mb Pure, DDR \$610		S-400 \$214		<b>Modems</b>	
Athlon 900 & fan \$255		GA-60X \$195		V7700 GeForce GTS 64Mb Deluxe, DDR \$660		S-600 \$262		56K Int. \$50	
Athlon 1G & fan \$315		MSI-694D Master \$290		V7700 GeForce 64Mb Ultra \$850		S-800 \$550		Netcomm 56K Int. \$55	
Athlon 1.2G & fan \$350		MSI-636D \$158		V8200 GeForce 3 64Mb \$970		Laser LBP800 (8ppm) \$475		56K Ext. or USB \$90	
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Duron 800 & fan \$140		<b>PROTAC</b>		<b>Hercules</b> 3D Prophet II 64Mb GTS \$620		HP 840C \$210		Netcomm Roadster \$180	
Duron 850 & fan \$180		M758Lmr / M754Lmr \$165		<b>Hercules</b> 3D Prophet II 64Mb Ultra \$875		LaserJet 1200 \$765		U.S Robotics 56K \$180	
Duron 900 & fan \$200		Abit VP6 Dual cpu \$335		<b>Hercules</b> 3D Prophet GeForce III 64Mb \$999		Panasonic KX6100 \$305		PCMCIA 56K \$140	
<b>Hard disks</b>		<b>AMD Athlon</b>		<b>Eagle</b> GeForce II MX AGP 32Mb TV-out \$175		<b>Scanners</b>		<b>Networking</b>	
<b>Western Digital</b>		Gigabyte 71XE4 \$170		<b>Eagle</b> GeForce II MX G400 64Mb TV-out \$230		<b>Acer</b>		Network card 10M \$22	
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WD 307AB 30GB \$200		Gigabyte 7ZX \$210		<b>Voodoo</b> III 3000 AGP 16Mb power color \$180		640P Vuego \$120		5 Port Hub 10Mb \$50	
<b>7200 RPM</b>		ASUS A7VL-VM \$200		<b>CD Rewriters</b>		640UT Vuego \$150		8 Port Hub 10Mb \$64	
WD 100BB 20GB \$170		ASUS A7V-E \$240		Diamond DD10432A 32x10x4 IDE Kit \$255		Canon N340P \$110		4 Port Hub 100Mb \$90	
WD 200BB 20GB \$200		ASUS A7V133-C \$280		LG CED-8080B 32x8x4 IDE Kit \$220		Canon N640P \$130		8 Port Hub 10/100M \$150	
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WD 400BB 40GB \$300		ASUS A7V266 \$370		Acer 10832IA 32x10x4 IDE Kit \$260		Canon N1220U \$250		<b>Removable Storage</b>	
<b>Seagate</b>		ASUS A7M266, DDR \$380		Aopen RW1232 32x12x10 IDE Kit \$320		Canon N660U \$255		1.44Mb Floppy \$27	
Barracuda III 20GB \$200		ASUS A7A266 \$370		Sony CRX140E 32x8x4 IDE oem \$220		HP 3300C \$150		120Mb disk \$18	
Barracuda III 30GB \$250		ABIT KT7 \$250		Sony CRX160E 32x12x8 IDE oem \$295		HP 4300C \$189		100Mb Zip Internal \$110	
Quantum 20GB \$200		ABIT KT7A \$268		Sony CRX160S 32x12x8 SCSI oem \$350		Mitsubishi DV648U \$100		100Mb Zip disk \$17	
Quantum 30GB \$250		ABIT KT7A Raid \$328		Ricoch MP7125A 32x12x10 IDE Kit \$350		<b>Epson Perfection 640</b> \$255		250Mb Zip disk \$25	
<b>MSI</b>		MSI KT7 Pro II A \$225		Ricoch MP7200A 40x20x10 IDE Kit \$450		<b>Add on cards</b>		<b>Cases</b>	
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Deskstar 40GB \$300		MSI 6340M \$240		Iomage external 6x4x4 USB \$350		PCI SCSI II card \$50		ATX Full tower case \$110	
		MSI K7T266 Pro-R \$349		Kodak USB external Drive 8x4x4 \$450		USB PCI card \$40		ATX Aopen HQ45 \$120	
		PROTAC M810 \$180						ATX Aopen HQ08 \$185	

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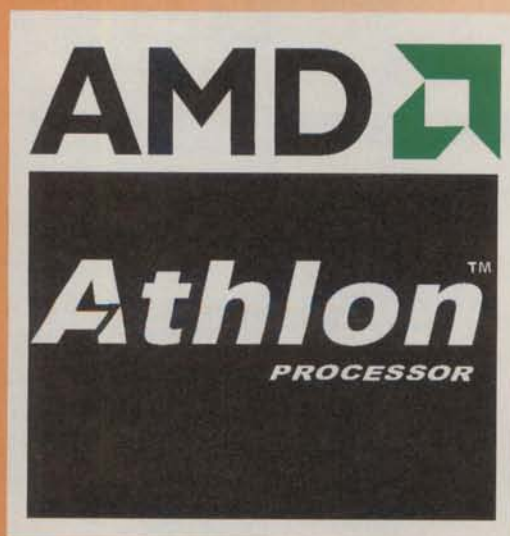
Intel Xerix pro		AMD Astra pro		Value Series		SYSTEM OPTIONS	
<ul style="list-style-type: none"><li>• 128M SDRAM PC133</li><li>• 20GB 7200rpm HDD</li><li>• Panasonic Floppy</li><li>• 32M TNT2 Video card</li><li>• S/B 128 3D Sound card</li><li>• 50x CD Rom</li><li>• 17" Acer / LG Monitor</li><li>• 480 Watt Speakers</li><li>• Midi Deluxe ATX case</li><li>• Acer Win98 Keyboard</li><li>• Microsoft Intellimouse &amp; Pad</li></ul>		<ul style="list-style-type: none"><li>• 128M SDRAM PC133</li><li>• 20GB 7200rpm HDD</li><li>• Panasonic Floppy</li><li>• 32M GeForce II MX</li><li>• S/B 128 3D Sound card</li><li>• 50x CD Rom</li><li>• 17" Acer / LG Monitor</li><li>• 480 Watt Speakers</li><li>• Aopen KF45 ATX case</li><li>• Acer Win98 Keyboard</li><li>• Microsoft Intellimouse &amp; Mouse</li></ul>		<ul style="list-style-type: none"><li>• 64M SDRAM PC133</li><li>• 10GB HDD UDMA 100</li><li>• Panasonic Floppy</li><li>• 8M Video card built-in</li><li>• PCI 3D Sound card built-in</li><li>• 56K Modem V90</li><li>• 50x CD Rom</li><li>• 15" SVGA Monitor</li><li>• 120 Watt Speakers</li><li>• Midi Deluxe ATX case</li><li>• Win98 Keyboard</li><li>• A4 Mouse &amp; Pad</li></ul>		<b>Monitors</b> 15" <b>Samtron</b> 55E \$240 15" <b>Daewoo</b> 523X \$240 15" <b>Mitsubishi</b> Diamond /LG \$250 17" <b>Olympic</b> \$360 17" <b>Acer</b> V771C \$370 17" <b>Mitsubishi</b> 1770g \$370 17" <b>LG</b> 775N \$370 17" <b>Samsung</b> 75E \$370 17" <b>Hitachi</b> CM615ET \$390 17" <b>Diamond</b> 17NF \$598 17" <b>Sony</b> CPDE220 \$650 19" <b>Sony</b> CPDG420 \$1230 19" <b>Mitsubishi</b> 1995SL \$705 <b>CD Rom / DVD Rom</b> 50x or 52x CDROM \$75 DVD 8X <b>Hitachi</b> \$120 DVD 12x <b>Samsung / Aopen</b> \$145 DVD 16x <b>Pioneer</b> \$170 DVD 16X <b>Aopen</b> kit \$250 <b>Speakers</b> 120W SPKs / 480W \$15/\$30 400W SPKs mini Sub-Woofer \$40 600W Sub-Woofer SPKs. \$70 <b>Creative</b> PC Works S/Woofer \$78 <b>Creative</b> FPS1500 4 point \$178 <b>Creative</b> FPS1000 4 point \$152 <b>Altec Lansing</b> ACS22 /33 \$45/\$80	
<b>Mouse</b> A4-Tech PS/2 or Serial \$8 A4-Tech PS/2 wheel \$15 A4-Tech 4D wheel \$30 A4-Tech wireless PS/2 \$30 A4-Tech scroll Track \$30 8D Wheel Mouse \$30		 PS/2 Mouse \$15 Wheel Mouse PS/2 or USB \$30		 IntelliMouse PS/2 \$30 IntelliEye Mouse Optical \$75 IntelliEye Mouse Explorer \$90 <b>SAMSUNG</b> Cyber Optical \$50 <b>Keyboards</b> Windows 98 K/B AT or PS/2 \$15 <b>Acer</b> K/B AT&PS/2 \$20 Multimedia K/B AT or PS/2 \$25 <b>Logitech</b> Cordless iTouch \$140 <b>Microsoft</b> Internet K/B \$40 <b>Microsoft</b> Internet Pro K/B \$85 <b>Microsoft</b> Natural K/B \$45 <b>Honeywell</b> Multimedia \$50 Wireless K/B with mouse p \$80 LG wireless K/B with mouse \$100			
Celeron 733 \$1340 Celeron 800 \$1360 Celeron 850 \$1380 Pentium III 866 \$1550 Pentium III 933 \$1600 Pentium III 1G \$1620		Duron 800 \$1390 Duron 850 \$1430 Duron 900 \$1450 Athlon 1G \$1570 Athlon 1.2G \$1600 Athlon 1.3G \$1700		Celeron 733 \$999 Celeron 800 \$1020 Celeron 850 \$1060 Pentium III 866 \$1250 Pentium III 933 \$1290 Pentium III 1G \$1310			
<b>Blank CDs</b> Aterra \$0.8 Ricoh/Kodak/Misumi \$1.5 Verbatim 80min \$2.0 Rewritable CD \$4.0		<b>Cameras</b> Logitech Express \$95 Creative web cam \$100 Vcam Digital \$90 Intel USB Camera \$100		<b>Software</b> Windows Millennium \$200 Windows 98 2nd edition \$200 Windows 2000 oem-Full \$300 MS WorkSuite 2001 oem \$140 Office 2000 Small Bus \$380 MS Office 2000 oem Professional-Full \$500			

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CE-56PBK	SO20093	STYLUS Colour 400/500/600/Photo Black	\$17.00
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CE-68PCL	SO20193	STYLUS Photo 750 5-Colour	\$33.00
CE-69CL	T003011	STYLUS Colour 900 Black	\$19.00
CE-70CL	T005011	STYLUS Colour 900 Colour	\$24.00
CE-71PCL	T001011	STYLUS Photo 1200 5-Colour	\$29.00
CE-27BK	T007	STYLUS Colour 870/1270 Black	\$24.00
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A3WF	A3 White Film 100mu	50	\$ 90.00	1.80
A4CF	A4 Clear Film 100mu	50	\$ 39.00	0.78
A3CF	A3 Clear Film 100mu	50	\$ 71.00	1.42
A4FGP	A4 Full Gloss Photo Paper	50	\$ 44.00	0.88
A3FGP	A3 Full Gloss Photo Paper	50	\$ 79.00	1.58
A4PH	A4 Economy Photo Paper	50	\$ 23.00	0.46
AC2	Artists Canvas	25	\$ 60.00	2.40
GC4F	Greeting Card (4 Fold)	100	\$ 28.00	0.28
GCBF	Greeting Card (Bi-Fold)	100	\$ 48.00	0.48
DCCS	Double Coated Card Stock	50	\$ 24.00	0.48
GCS	Glossy Card Stock	50	\$ 24.00	0.48
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CANON BJ-300/330	7	4-BKL
CANON BJC-600/610/620	16	5-BKL
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21	45	19-BKL
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20	9	18-BKL
CANON BJC-3000/6000/8000 Series	12	46-BKL
HP Desk Jet 400/500 Series	6	8A-BKL
HP Desk Jet 600/660/690 Series	6	8B-BKL
HP Desk Jet 700/800/900/1000 Series	8	29-BKL
HP Desk Jet 300 Series & Olivetti JP's!	8	7-BKL
EPSON Stylus 400/800/800+/1000	8	1-BKL
EPSON Stylus Colour /PRO/XL	12	2-BKL
EPSON Stylus 820/colour II/III	12	23-BKL
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	12	33A-BKL
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900	12	33B-BKL
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series	12	35A-BKL
IBM/LEXMARK 5000/5700/7000 & Z Series	12	35B-BKL
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CANON BJC-600/610/620	3x8	10-CLR
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21	3x30	17-CLR
CANON BJC-3000/6000/8000 Series	3x8	47-CLR
HP Colour Desk Jet 300/400/500 Series & Olivetti!	3x12	14A-CLR
HP Colour Desk Jet 600C/660C/690C Series	3x12	14B-CLR
HP Desk Jet 850C/855C/870C/1000C Series	3x3	30A-CLR
HP Desk Jet 710/720/890/900 Series	3x3	30B-CLR
EPSON Stylus Colour /PRO/XL	3x4	16-CLR
EPSON Stylus 820/colour II/III	3x12	24-CLR
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	3x12	34A-CLR
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900	3x12	34B-CLR
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series	3x6	36A-CLR
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  - NO SOFTWARE WITH THIS
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  - Browser Wheel Mouse
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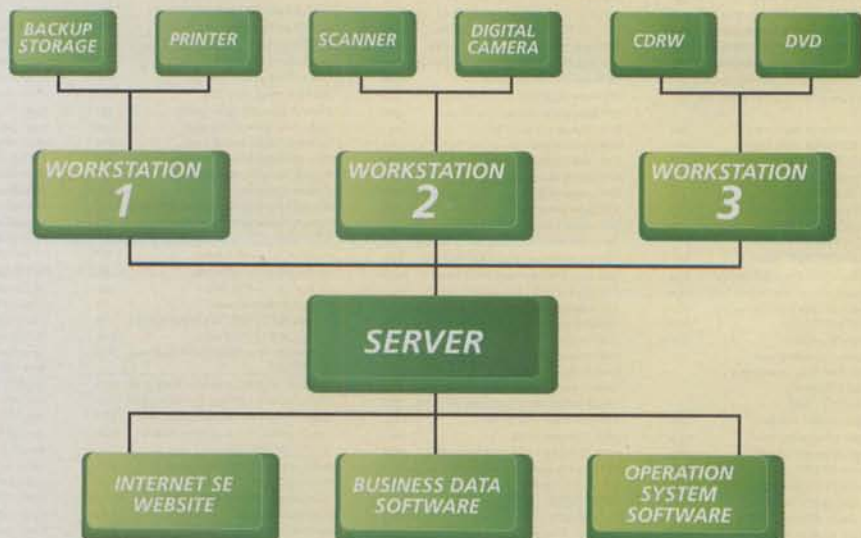
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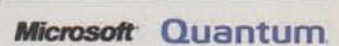
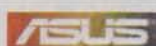
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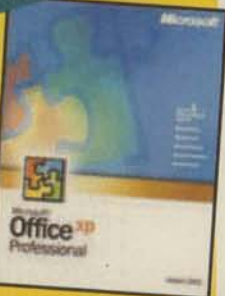
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### Notebook PC Special Offer: Free Executive Notebook Carry Bag, Offer Ends 31 August 2001

Model	CPU	RAM	HDD	Screen	Optical Drive	Special Features	Software	Special Offer	Price	Finance Weekly
Excel 1000	PIII 1GHz	128MB	15GB	14.1" TFT	8X DVD	LAN 10/100, Fax/Modem, IEEE 1394 FIREWIRE	Window ME	Free Bag	\$3,629	\$35.62
Toshiba	PIII 700	128MB	20GB	14.1" TFT	8X DVD	LAN 10/100, Fax/Modem	Window ME	Free Bag	\$4,714	\$46.22
Compaq	PIII 850	128MB	20GB	14.1" TFT	6X DVD	LAN/100, Fax/Modem	Window ME	Free Bag	\$4,765	\$46.80
IBM	PIII 800	128M	10GB	15" TFT	24X CD	LAN 10/100, Fax/Modem	Window 98	Free Bag	\$3,585	\$35.22

### Lantrix PC Upgrade Special: Double Your Memory For Free, Offer Ends 31 August 2001

CPU	Motherboard	RAM	HDD	Video	Optical Drive	Sound Card	Special Offer	Price	Finance Weekly
Intel Celeron 766	GA-6VXC7-4X-P	64MB	20GB	8MB AGP	Acer 52X	Vibra 128	Double Ram	\$831	\$8.15
Intel PIII 866	GA-6VXC7-4X-P	64MB	20GB	32MB TNT2 M64	Acer 52X	Vibra 128	Double Ram	\$1096	\$10.54
Intel P4 1.4GHz	GA-8TX	64MB	20GB	32MB TNT2 M64	Acer 52X	Creative PCI	Double Ram	\$1650	\$16.19
AMD Athlon 1GHz	MSI KT7 Turbo	64MB	20GB	32MB TNT2 M64	Acer 52X	Built in 3D	Double Ram	\$1120	\$10.99
Athlon 1.2GHz 266FSB	MSI KT7 PRO	64MB	30GB	32MB TNT 2M64	Acer 52X	Vibra 128	Double Ram	\$1350	\$13.25

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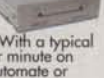
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CANON BJ-300/330	7	4-BKL
CANON BJC-600/610/620	16	5-BKL
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21	45	19-BKL
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20	9	18-BKL
CANON BJC-3000/6000/8000 Series	12	46-BKL
HP Desk Jet 400/500 Series	6	8A-BKL
HP Desk Jet 600/660/690 Series	6	8B-BKL
HP Desk Jet 700/800/900/1000 Series	8	29-BKL
HP Desk Jet 300 Series & Olivetti JP's!	8	7-BKL
EPSON Stylus 400/800/800+1000	8	1-BKL
EPSON Stylus Colour /PRO/XL	12	2-BKL
EPSON Stylus 820/colour II/III	12	23-BKL
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	12	33A-BKL
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900	12	33B-BKL
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CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21	3x30	17-CLR
CANON BJC-3000/6000/8000 Series	3x8	47-CLR
HP Colour Desk Jet 300/400/500 Series & Olivetti!	3x12	14A-CLR
HP Colour Desk Jet 600C/660C/690C Series	3x12	14B-CLR
HP Desk Jet 850C/855C/870C/1000C Series	3x3	30A-CLR
HP Desk Jet 710/720/890/900 Series	3x3	30B-CLR
EPSON Stylus Colour /PRO/XL	3x4	16-CLR
EPSON Stylus 820/colour II/III	3x12	24-CLR
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	3x12	34A-CLR
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900	3x12	34B-CLR
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series	3x6	36A-CLR
IBM/LEXMARK 5000/5700/7000 & Z Series	3x6	36B-CLR
CANON, EPSON, HP Fluorescent & Photo Realistic Kits!	12/Colour	Please Call!

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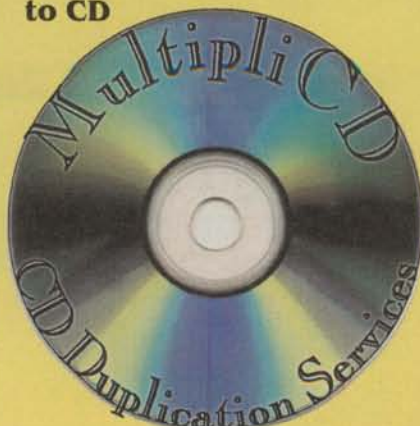
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CANON BJ30/50/70/80/85 BCI-10/11 BK	30/80	C10
CANON BJ10/BJ20/BJ210/BJ210sp/BJ255sp	7	C2/C2A
CANON BJC600/610/620	15	C5
CANON BJC2000/4000/4200/4550 BCI-21/20	50/8	C8
CANON BJC 3000/6000/6500	6	C19
CANON BJC 7000/7100	6	C15
HP DESKJET 400, 500 & 600 SERIES	7	H2/H4
HP DESKJET 700/800/900/1100/1200 SERIES	6	H13
HP DESKJET 1200 B.Y.C.M	6	H8
EPSON STYLUS COLOUR 750/900/1200	12	E#
EPSON STYLUS 400/800/1000	8	E1
EPSON STYLUS COLOUR / PRO / XL	6	E2
EPSON STYLUS 820 / COLOUR 11/11S/200	12	E4
EPSON COLOUR 400/500/600/700/Photo Ex	12	E7
EPSON COLOUR 440/640/740/800/850/1520	12	E7
EPSON STYLUS COLOUR 750/900/1200	12	E14
EPSON STYLUS COLOUR 680/777/870/1270	12	E18
IBM 4076/LEXMARK	6	M1
LEXMARK 3200/5000/7000Z SERIES	5	M5

### COLOUR REFILLS from only \$38.00

PRINTER	NO. OF FILLS OF EACH COLOUR	KIT NO
CANON BJC 3000/6000/6500/8500	5	C20
CANON BJC 50/70/80/85	60	C11
CANON BJC210/BJC210sp/BJC255sp	12	C3
CANON BJC600/610/620	8	C6
CANON BJC4000/4100/4200/4550 BCI-21	30	C9
CANON BJC 7000/7100	6	C16
HP DESKJET 400, 500 & 600 SERIES	12	H3/H5
HP DESKJET 700/800/900/1100/1200 SERIES	7	H14
EPSON STYLUS COLOUR / PRO / XL	6	E3
EPSON STYLUS 820/COLOUR/11/11S	12	E5
EPSON COLOUR 200/400/500/600/800/1520	12	E8/E9
EPSON COLOUR 440/480/580/640/740	12	E9
EPSON STYLUS COLOUR 680/777/870/1270	12	E19/E20
IBM 4076/LEXMARK	12	M2
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HP DESKJET 710/720/750/780/820/890/893 & MORE  
CANON BJ-30 / BJ-50 / BJ-70 / BJ-80  
CANON BC-01 / BC-02 / BC-03 / BC-05 / BJ10E/BJ200/BJC210/240/255sp plus more  
CANON BJ300/B.330  
CANON BC20/BC121C/2000/4000/4100/4200/4310/4550 & BC-22 photo kit  
CANON BJ600/610/620  
CANON BJ800/820/860  
CANON BJC5000/5100/5500/BC-23 (PIGMENT) BC121C Ask about 8200  
CANON BJC-6000/BJC-3000/BJC-8500/BC-30/BC-31  
CANON BJC-6000 PHOTO KIT / BC-32 ask about 3000 photo kit  
CANON FLUORESCENT BC-25F  
CANON BJC-7000/7100/BC-80/OPTIMISER INK/BC-161  
CANON BJC-7000/BJC-7100/BC62/ PHOTO KIT  
CANON BJC-8200/BCI-5BK/BCI-5M/BCI-5Y/BCI-5Y Photo  
EPSON SMART CHIP PRINTERS 870, 777, 870, 880, 880, 1270, 1280 PHONE FOR KIT CODE  
EPSON STYLUS COLOR 800 /1520  
EPSON STYLUS 800/800+/1000/400/300  
EPSON COLOR/COLOR PRO/XL SERIES  
EPSON STYLUS COLOR 300 FOUR COLOR KIT  
EPSON STYLUS 200/COLOR11/115 SERIES, 820  
EPSON COLOR STYLUS 400/600 SERIES  
EPSON STYLUS 440/460/480/680/670  
EPSON COLOR 740/750/760/860/880/1160/1200 Bk only  
EPSON STYLUS COLOR 900/T-003/T-005  
EPSON STYLUS COLOR 500  
EPSON COLOR 3000/5000 1 X KIT PER COLOR  
EPSON STYLUS COLOR 480/580/T-013/T-014  
EPSON STYLUS PHOTO 700/E700/720/750/1200  
LEXMARK/IBM4078/1020/2030/2050/2070/1000/1100  
LEXMARK/IBM2030/2050/ PHOTO  
LEXMARK 3200/5700/5770/7000/7200/2111/2131waterproof  
LEXMARK 3200/5700/5770/7000/7200 photo (bk w/wproof)  
LEXMARK Z12 / Z22 / Z32 (black-waterproof)  
LEXMARK Z42 / Z51 (black-waterproof)  
BROTHER MFC-7150 / 7160 / LC02BK / M/C/Y)  
SAMSUNG M10 SERIES  
OLIVETTI JP 150/250/350/360/450/OFX2035/3100  
CLEANING KIT - Hewlett Packard, Canon, Lexmark only  
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### Number of Black fills

CODE	Number of COLOUR fills	CODE
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K3BK	12	K43CLR / K25CLR
K3BK	6	K22CLR
K7BK	30	K1CLR
K8BK/K4BK	6	K2CLR
K9BK		
K12BK	30	K5CLR / K18CLR
K10BK	6	K3CLR
K11BK	6	K4CLR
K27BK	30	K5CLR
K28BK	6	K35CLR
	6	K36CLR
	6	K21CLR
	6	K24CLR
	6	K15CLR
	6	K39CLR
	6	
	6	K20CLR
	6	K6CLR
	6	K6CLR
	6	K33CLR
	12	K8CLR / K7CLR
	12	K20CLR
	12	K16CLR
	12	K16CLR
	12	K37CLR
	12	K8CLR
	3	K34CLR
	12	K40CLR
	12	17CLR
	6	K13CLR
	12	K29CLR
	6	K25BK
	6	K25BK
	6	K25BK
	6	K25BK
	6	K30BK
	10	K25BK
	6	K20BK
		K12

### DESCRIPTION - CARTRIDGES

CODE	R.R.P.
CANON BJC-600/BJC-700/BJC-800	425K \$8.80
CANON BJC-600/BJC-700/BJC-800	425K \$13.20
CANON BJC-600/BJC-700/BJC-800 HC	425K \$11.00
CANON BJC-600	203K \$8.80
CANON BJC-600 2 per pack	409K \$15.40
CANON BJC-600 2 XY/M/C	409K \$13.00
CANON BJC-600 HE - CAPACITY	497K \$8.90
CANON BJC-800 Black / yellow / cyan / mag	2290 \$14.30
CANON BJC-400	413K \$9.90
CANON BJC-400	413K \$13.90
CANON BJC-600	3487K \$6.90
CANON BJC-600 magenta / cyan / yellow	3487K \$11.90
CANON BJC-600 Photo BK / C / M	3487K \$11.90
EPSON STYLUS COLOR	4122K \$4.30
EPSON STYLUS COLOR11 / 820	4122K \$12.00
EPSON STYLUS COLOR 400/500/600/700	4122K \$16.50
EPSON STYLUS COLOR 400/600/700/750	2556K \$17.60
EPSON STYLUS COLOR 800 / 580	700K \$16.00
EPSON STYLUS COLOR 800 / 580	700K \$24.00
EPSON STYLUS COLOR 870 / 875 / 880	700K \$20.00
EPSON STYLUS COLOR 870 / 875 / 880	700K \$29.90
EPSON STYLUS COLOR 870 / 875 / 880 ILIS	700K \$69.90
EPSON STYLUS COLOR 740/760/860	2557K \$18.70
EPSON STYLUS COLOR 900	2729K \$22.00
EPSON STYLUS 800	4073K \$12.20
EPSON COLOR 800/850/1520	4113K \$14.40
EPSON STYLUS COLOR 1500	4115K \$26.40
EPSON SQ1170	4130K \$20.00
EPSON STYLUS COLOR / COLOR PRO	4123K \$4.20
EPSON STYLUS COLOR11 / PRO	4123K \$4.20
EPSON STYLUS COLOR 500	434A \$22.00
EPSON STYLUS CLR 400/600/800/850/1520	4114K \$24.20
EPSON STYLUS CLR 400/600/700/800/1160	2558K \$26.40
EPSON STYLUS CLR PHOTO 720	4112K \$29.70
EPSON STYLUS CLR 900 / 980	2769K \$24.00
EPSON STYLUS CLR PHOTO EX / 700	4112K \$26.00
EPSON STYLUS CLR COLOR 1270 ILIS	700K \$95.00
EPSON STYLUS CLR COLOR 1270	700K \$36.00
EPSON STYLUS CLR COLOR 1200	2769 P \$26.00
EPSON STYLUS CLR 3000 / 5000 BK / C / M / Y	4448 \$27.00

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### PRODUCT DESCRIPTION

CODE	PRODUCT DESCRIPTION
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24120-8	PREMIUM QUALITY PHOTO GLOSS LAB PAPER 260 GSM
31120-8	PHOTO GLOSSY WHITE FILM (100UM)
26116-2	PHOTO GLOSSY PAPER 180GSM MAKES ANY INK WATERPROOF
26116-3	PHOTO GLOSSY GREETING CARDS W/ WATER RESISTANT
12108-3	TRANSPARENCY FILM (100UM)
11108-2	SILVER REFLECTIVE FILM (150UM)
13208-7	ARTIST CANVAS (200GSM)
32110-8	POLY SILK ADHESIVE BACKED FABRIC (100GSM)
34110-8	CLEAR WINDOW DECAL - STICKS TO GLASS
27199-6	T-SHIRT EASY IRON ON TRANSFER PAPER-PEEL OFF WHEN COLD
13105-9	HI RESOLUTION PREMIUM MATTE PAPER - WATER RESISTANT
14103-4	BANNER PAPER/ EACH BANNER UP TO 4.2 METRES LONG X A4 WIDE
14210-9	DESIGN A MAG - FRIDGE MAGNETS
13708-2	CD LABEL (STARTER KIT) SOFTWARE & 2 SAMPLES OF EACH TABLE
13610-8	CD LABELS (FUN KIT)
13810-2	CD LABELS (RAINBOW REFILL)
13910-2	CD LABELS (GALAXY REFILL)
14110-2	CD LABELS (STARBURST REFILL)
14010-5	CD LABELS (CRYSTAL REFILL)
24103-1	CD LABELS (PHOTO GLOSSY REFILL)
13110-3	DESIGN A MAGNETIC - BUSINESS CARD
	BUSINESS CARDS 2 SIDED GLOSSY-MATTE

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A4	10	\$21.90
A4	100	\$16.50
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8.25 x 11	10	\$27.50
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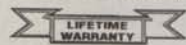
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40Gb IBM 7200rpm ATA100	
3.5" FDD Panasonic	
Macase Deluxe 300W ATA Case	
32M Leadtek Geforce II MX200	
MS Internet KB & Intellimouse	
15" Samsung 550s Monitor	
50 Speed CD-ROM Acer	
Creative VB128 Sound Card	
720W Subwoofer Speakers	

#### TI SB Server Pack

Dual PII 866 x 2	\$2,145
Dual PIII 933 x 2	\$2,225
Dual PIII 1G x 2	\$2,275
ASUS CUV4X-D Dual CPU M/B	
4xUSB ATA 100 & 4x AGP	
3.5" FDD Panasonic	
256Mb SD RAM PC133 Apacer	
40Gb IBM 7200 ATA100	
8Mb AGP SVGA Card	
Macase Deluxe 300W ATA Case	
PS II Keyboard & Mouse	
15" Samsung 550s Monitor	
50 Speed CD-ROM Acer	
Intel 10/100 PCI Network	

#### TI Pro Server Pack

Dual PII 866 x 2	\$2,960
Dual PIII 933 x 2	\$3,065
Dual PIII 1G x 2	\$3,120
ASUS CUV4X-D Dual CPU M/B	
4xUSB ATA 100 & 4x AGP	
Adaptec 29160 SCSI Card	
3.5" FDD Panasonic	
256Mb SD RAM PC133 Apacer	
8Mb AGP SVGA Card	
18Gb IBM 10,000rpm U160 SCSI	
15" Samsung Monitor	
Macase Deluxe 300W ATA Case	
PS II Keyboard & Mouse	
50 Speed CD-ROM Acer	
Intel 10/100 PCI Network Card	

#### CPU

Pentium 766 Celeron CPU	\$162
Pentium 800 Celeron CPU	\$169
Pentium III 866E Intel CPU	\$368
Pentium III 933E Intel CPU	\$405
Pentium III 1GB Intel CPU	\$430
Socket to slots convertor	\$15
Pentium 4 1.4GHZ	\$440
Pentium 4 1.5GHZ	\$570
Pentium 4 1.7GHZ	\$775
Duron Socket A 850MHZ	\$145
Duron Socket A 900MHZ	\$165
AMD K7 1G CPU	\$248
AMD K7 1.2G c CPU	\$268
AMD K7 1.33G c CPU	\$345
AMD K7 1.4G c CPU	\$420
Cooler Master For AMD	\$25

#### Hub

Acer 8 Port 10 Mbps Hub BNC	\$69
Netgear 8 Port 10/100 DS108	\$215
Netgear 16Port 10/100 DS116	\$399
Netgear 16 Port 10/100 DS516	\$609
Netgear 24 Port 10/100DS524	\$790

#### Switch

Skylink 8 Port 10/100 Switch	\$130
Netgear 8 Port Switch FS105	\$158
Netgear 8 Port Switch FS108	\$265
Netgear 16 Port Switch FS116	\$510
Netgear 16 Port Switch FS516	\$838
Netgear 24 Port Switch FS524	\$999
EDI Max 24 Port Switch 10/100	\$665
Printer Server	
Netgear PS105	\$228
Netgear PS110	\$258
Router	
Netgear RT311	\$315
Netgear RT314	\$385
Netgear RM 356A 56K F/M	\$535

#### FAX Modem

56K Netcom Internal F/M	\$49
56K Web Excel External F/M	\$90
56K Netcom 56K V90 Serial	\$109
56K Netcom Roadster USB	\$175
56K PCMCIA Kingmax F/M	\$115

#### Memory

128MB SDRAM PC133 Apacer	\$53
256MB 168P SD RAM PC133	\$105
128MB DDRAM PC2100	\$115
256MB DDR Ram PC 2100	\$190
128MB RD RAM	\$199
256MB RD RAM	\$425
Memory for Notebook	Call

#### Hard Drive

20GB Seagate 5400rpm HDD	\$165
20GB IBM 7200RPM ATA100	\$210
40GB IBM 7200RPM ATA100	\$280
60GB IBM 7200RPM ATA 100	\$420
75GB IBM 7200RPM ATA 100	\$550

#### SCSI HDD

15" Samsung SyncMaster 550S	\$375
17" Samsung SyncMaster 753DF	\$470
21" Samsung 1100P	\$1,599
15" Samsung 570s LCD	\$1,699
17" Sony E220 0.24dpi Flat	\$615
19" Sony G420 0.24dpi Flat	\$1,215
21" Sony G520 0.24dpi Flat	\$1,985
Sony SD-MM51 15" LCD	\$1,720

#### Notebook HDD 2.5"

Fujitsu 10GB 9.5mm	\$228
IBM Travelstar 10GB IDE 9.5mm	\$228
IBM Travelstar 20GB IDE 9.5mm	\$315
IBM Travelstar 30GB IDE 9.5mm	\$585

#### Scanner

HP3300 USB Scanner	\$138
HP4300 Scanner	\$185
HP5300 Scanner	\$345
Canon N640 Parallel Scanner	\$139
Canon N650U USB	\$165
Canon N1220U USB Scanner	\$255
Canon N660U Film USB	\$255
Epson 1640SU	\$535
Epson 1640SU Photo	\$675

#### Sound Card

Audio Excel PCI 3D Sound	\$28
Creative VB 128 PCI Sound	\$38
Creative Live Value PCI Sound	\$99
Live Digital Entertainment 5.1	\$178
Creative Live Platinum 5.1	\$405

#### Monitor

Hitachi 17" CM615 0.23dpi	\$378
Hitachi 19" CM715 0.22dpi	\$720
Hitachi 19" CM772 0.22dpi	\$925
Hitachi 15" CML151XW LCD	\$1,425
Hitachi 17" CML170SXW LCD	\$2,495
Acer 17" Acerview	\$359
Acer 19" Acerview G991	\$690
Acer 15" LCD With Speaker	\$1,450
Mitsubishi 15" D/View	\$268
Mitsubishi 17" D/View 1770	\$369
Mitsubishi 19" D/View 1995	\$708
Mitsubishi 19" D/View DV19NF	\$1,020
Mitsubishi 21" D/View 2107	\$1,299
Mitsubishi 15" DV150 LCD	\$299
15" Samsung SyncMaster 550S	\$399
17" Samsung SyncMaster 753DF	\$599
21" Samsung 1100P	\$1,299
15" Samsung 570S LCD	\$299
17" Sony E220 0.24dpi Flat	\$399
19" Sony G420 0.24dpi Flat	\$499
21" Sony G520 0.24dpi Flat	\$599
Sony SD-MM51 15" LCD	\$299



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## Better Living in the Digital World

### Windows® 2000 Professional

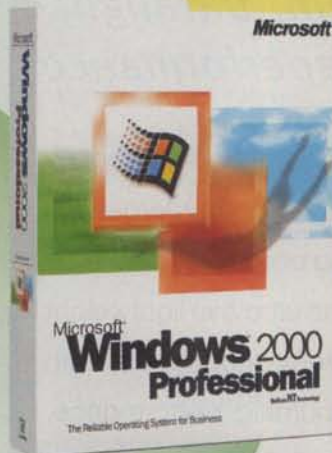
**Microsoft Operating System for Business:** The next generation of NT workstation for the desktop. Built on Windows NT® technology and an easy-to-use, familiar Windows® 98 user interface, Windows 2000 Professional makes business users more productive. Its integrated Web capabilities and broad support for mobile computers and hardware devices makes Windows 2000 the easy way for business users to connect to the Internet anywhere and anytime. And its rock-solid reliability and improved manageability simplify desktop management for IT Professionals.

- The best way to Internet-enable your business using integrated Web application services, increased scalability and industry-standard security.
- A more reliable platform designed for increased system uptime.
- A more manageable operating system to lower desktop management costs.
- Will enable knowledge workers to be more productive and take advantage of new devices.

Version Upgrade from Windows NT WorkStation (88594) GST INC: **\$275**

Product Upgrade from Windows 95/98 (88593) GST INC: **\$405**

Full Version (88592) GST INC: **\$575**



#### For Home

The Best in Digital Media  
Improved User Experience  
Enhanced Home Networking



#### For Business

Internet Enable your Business  
Reliable, Manageable  
Best for New Business Devices

### Windows® Millenium Edition

*The new Microsoft Operating System for home use*

- **System Restores** lets you easily return your system to a working state in the event of a significant problem, so you can quickly get back to using your PC.
- With **Windows Image Acquisition**, you can easily import photos from scanners and cameras. No extra software is required to perform simple operations like previewing, rotating and printing.
- **Microsoft Movie Maker** gives you the power to create, edit and share movies over the Internet.
- **Windows Me** includes built-in safeguards that help prevent you (or applications) from deleting or overwriting key system files.
- **Internet Explorer 5.5** provides the richest online experience with easy search capabilities, faster browsing and easier printing.
- **Windows Me** is ready for home networking. You can easily set up a home network through your PC, and share printers, Internet connections and other devices.

**Windows® Millenium Edition Upgrade**  
(A3687) GST INC:

**\$165**



**Windows® Millenium Edition Full Version**

(A3686) GST INC:

**\$315**



Microsoft Office xp  
**SEE WEB DIRECT LINK & PAGE 64 FOR MORE DETAILS!**



**ACCESS**  
(C2079)  
GST INC:  
**\$614**



**EXCEL**  
(C2077)  
GST INC:  
**\$614**



**OUTLOOK**  
(C2086)  
GST INC:  
**\$197**



**WORD**  
(C2075)  
GST INC:  
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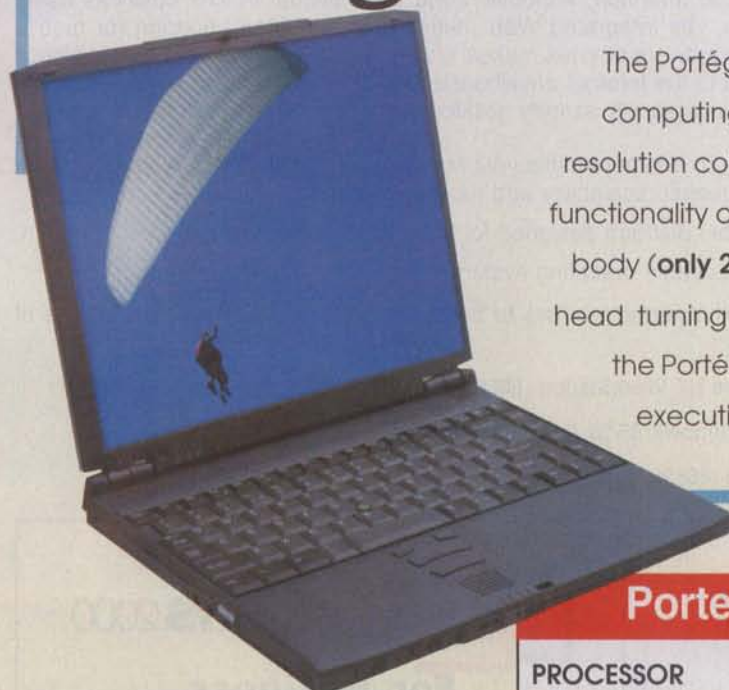
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## The ultimate statement in mobile computing

# Portégé

*Ultrathin, ultralight,  
ultraperformance*



The Portégé® is the ultimate statement in mobile computing with its Pentium® III power, large high resolution colour display, long battery life and easy functionality all packed into an ultra thin lightweight body (**only 2kg**) finished in sleek magnesium. With head turning style and work burning performance, the Portégé® is the perfect tool for the travelling executive ready to succeed in the new world.

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## Blue Tooth

*Wireless  
Solution*



Toshiba's wireless portable computer users to unplug from the restraints of conventional wired computing with a fully integrated Bluetooth PC Card, complete with SPANworks productivity software. Using short-range wireless radio communication Bluetooth facilitates fast and secure transmission of both voice and data at speeds of up to 1 Mbit/s (up to 20x faster than a standard). Toshiba's Bluetooth PC Card can be used to connect portable computers, printers, digital mobile phones, PDAs, digital cameras, network access points and other mobile devices to one another and connect to the Internet or a LAN with out the need for wires or cables.

(B6572) GST Inc

**\$257**

Portege	7220CTe	3490CT
PROCESSOR	PIII 650MHz	PIII 700MHz
RAM STD/MAX	64/192 MB	128 MB
HARD DRIVE	12 GB	20GB
SCREEN	13.3" TFT	11.3" TFT
DISPLAY	1024x768	1024x768
CD-ROM	Optional	Optional
MIC & SPEAKER	Yes	Yes
SELECT BAY	No	No
LAN	Optional	Yes
DVD CAPABLE	Yes	Yes - optional
WEIGHT	2 kg	2 kg
WARRANTY	3 Years	3 Years
OP System	Win 95/98	Win 98
Rent*	\$45.70	\$43.91
	<b>\$4,890</b>	<b>\$4,699</b>
	(A2839)	(B8629)
		Win NT/2K
		<b>\$45.31</b>
		<b>\$4,849</b>
		(B8695)

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## Satellite Pro Power

# Satellite Pro

*Exceptional  
performance with  
wireless connectivity!*

The Satellite Pro® series give you the best of both worlds — power and affordability. Built with just the right mix of features to let you power through day-to-day computing tasks with ease, colourful displays and powerful processors provide plenty of CPU horsepower to even the most demanding applications, while the integrated multimedia devices never leave functionality behind.



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Satellite Pro	4600-750	4600 - 750	4600-850	4600-900
PROCESSOR	Cel 750MHz	PIII 750MHz	PIII 850Mhz	PIII 900MHz
RAM STD/MAX	64 MB	128 MB	128/512 MB	128/512 MB
HARD DRIVE	15 GB	15 GB	20 GB	20 GB
SCREEN	14.1" TFT	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM/DVD	DVD	DVD	DVD	DVD
VIDEO RAM	8 MB	16 MB	16 MB	16 MB
56K v9.0 & 10/100 LAN	56k/Ethernet	56k/Ethernet	56k/Ethernet	56k/Ethernet
OPERATING SYSTEM	Windows '98	Windows '98	Windows '98	Windows '98
WARRANTY	1 Year	1 Year	1 Year	1 Year
Rent*	\$37.63	<b>NEW MODELS</b> Call for pricing or see Web Direct at top of page		
GST INC	<b>\$3,837</b>			
	(C4238)	(C5940)	(C5924)	(C5941)

RENTSMART

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**17**

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### TOSHIBA Accessories

Toshiba  
Tecra  
Battery  
Recharger

(90056)

**\$514**

Toshiba  
leather Bag  
for A4  
notebooks  
(68408)

**\$229**

Toshiba  
USB 18-Key  
Numeric  
keypad

(A3773)

**\$89**

Toshiba  
ACAdapter:  
for Satellite,  
Tecra or  
Portege

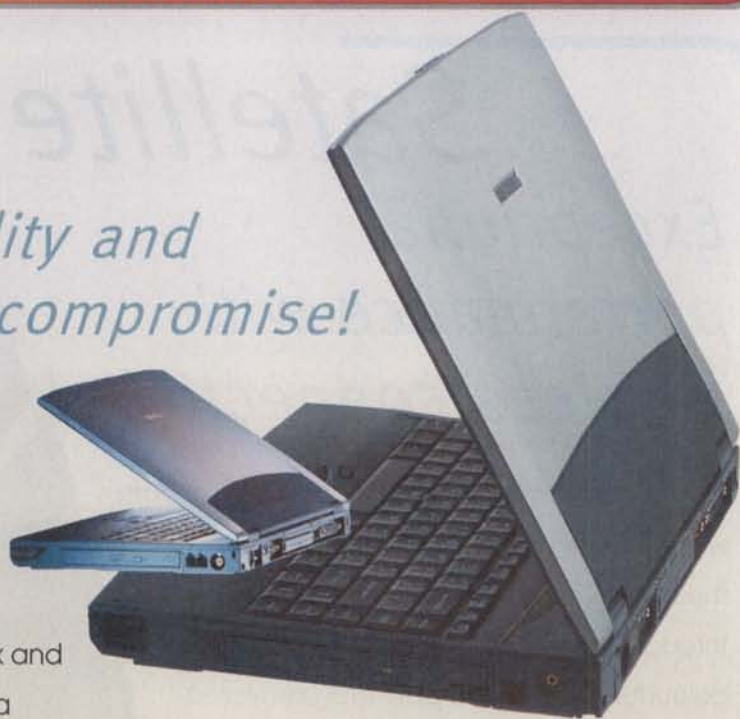
(44200)

**\$109**

## Tecra

*The most mobility and  
power without compromise!*

The Tecra® series is equipped for  
consistant mobile performance —  
providing you with the ultimate  
combination of traditional Tecra  
investment benefits, high processor  
performance and a new sleek look and  
feel that you will notice. Each Tecra  
comes with DVD drive standard.



Tecra	8100 - 750	8200 - 850	8200 - 1G
PROCESSOR	PIII 750MHz	PIII 850MHz	PIII 1GHz
RAM	128 MB	128 MB	256 MB
HARD DRIVE	20 GB	20GB	20GB
SCREEN	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM/DVD	6 x DVD	8 x DVD	8 x DVD / CDRW
PORT REPLICATOR	Optional	Optional	Optional
VIDEO RAM	8MB	16MB	16MB
56K v9.0 & 10/100 LAN	Yes	Yes/Wireless	Yes/Wireless
WEIGHT	2.8 kg	2.8 kg	2.8 kg
WARRANTY	3 Years	3 Years	3 Years
OP System	Win 98	Win 98	Win 98
Rent*	<b>\$53.04</b>	<b>\$60.72</b>	<b>\$78.54</b>
GST Inc	<b>\$5,819</b> (A2863)	<b>\$6,999</b> (B8636)	<b>\$9,199</b> (B8638)
OP System	Win NT	Win 2000	Win NT
Rent*	<b>\$54.68</b>	<b>\$62.43</b>	<b>\$80.13</b>
GST Inc	<b>\$5,999</b> (A2864)	<b>\$7,195</b> (B8637)	<b>\$9,385</b> (B8639)

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## Presentation Delivery in style.

Satellite	1800	1800	3000
PROCESSOR	Celeron 800MHz	PIII 850MHz	PIII 850MHz
RAM STD	64 MB	64 MB	64 MB
HARD DRIVE	10 GB	15 GB	15 GB
SCREEN	13.3" TFT	13.3" XGA	14.1" TFT
CD-ROM/DVD	CD	DVD	DVD
PORT REPLICATOR	No	No	No
VIDEO RAM	8 MB	8 MB	16 MB
56K v9.0 & 10/100 LAN	56 K	56 K/Eth	56 K/Eth
WARRANTY	1 Year	1 Year	1 Year
Rent*	\$Call	\$35.29	\$40.16
GST INC	<b>\$Call</b> (xxxxx)	<b>\$3,599</b> (C5251)	<b>\$4,298</b> (C5254)

## Satellite



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The Toshiba TLP-B2 Projector is an innovative and mobile communication solution, ultra portable and ideal for improving your presentation fields. Flexible input through a range of devices from DVD, VCR, television and notebook computers. Resolution: XGA 1,024x768, Brightness: 1,000 ANSI Lumens, Weight: 2.6 kg

Rent\* \$73.74

**TLP-B2**

(A1506) GST Inc **\$8,499**

## Projectors

*With a full range of display options, the Toshiba portable projectors are flexible to ensure your presentation is delivered in style.*

**TLP-670 (without camera)**

**TLP-671 (with Camera)**

Rent\* \$92.60 (A0321) GST Inc **\$10,846** Rent\* \$98.12 (A3458) GST Inc **\$11,978**

The Toshiba 670/671 Projectors are flexible enough to deliver your presentations in style! The 671 model comes with a unique swivel and folding camera allowing projection of hard copy material. Both projectors share the following features: **Resolution:** XGA 1,024x768, **Brightness:** 1,300 ANSI Lumens, **Weight:** 3.7 kg for 670 and 4.5 kg for the 671 (includes camera and swivel extension).



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# HP Networks & Servers

**NEXT BUSINESS DAY ADVANCE REPLACEMENT - LIFETIME WARRANTY**

\*\*\*PLEASE NOTE THAT PRICES ARE SUBJECT TO CHANGE ON ALL PRODUCTS\*\*\*

## HP ProCurve Switch 408

Unmanaged 8 port 10/100 switch in a compact sized package.

This switch offers half/full duplex, 10/100 autosensing on every port.

Warranty: Lifetime, Exchange Next Day (79125)

GST INC: **\$356**

## HP ProCurve Switch 2512 & 2524

**9.6GBPS BACKPLANE & AUTO-MDI-XI** • Lowest Price 10/100 Managed Switch • Provides a rich, layer 2 feature set • Includes 2 built-in gigabit transceiver slots • Auto MDI-X on all 10/100 and 100/1000 ports • Lifetime warranty for as long as you own the product • Wire-speed performance on all ports • FREE HP TopTools Management Software included

**2512** (12 port managed switch)

(A9703) GST INC: **\$1,619**

**2524** (24 port managed switch)

(B0062) GST INC: **\$2,059**

## HP ProCurve Switch 2312 & 2324

**NEW PRODUCT** Ideal for low-cost, unmanaged 10/100 connectivity • Lowest Price 10/100 Switch • Includes 2 Built-in Gigabit transceiver slots • Brings 10/100/1000 solutions to the market • Media-flexible ports for uplinks and server connections • HP quality, functionality and performance • Plug and play solution

**2312** (12 port unmanaged switch)

(B0063) GST INC: **\$979**

**2324** (24 port unmanaged switch)

(B0064) GST INC: **\$1,399**

## HP ProCurve Switch Modules

HP ProCurve Switch Gigabit Stacking Kit (78306) GST INC:

**\$426**

HP ProCurve Gigabit-SX Transceiver (82140) GST INC:

**\$1,289**

HP ProCurve Gigabit-LX Transceiver (82141) GST INC:

**\$2,049**

HP ProCurve 100/1000-T Transceiver

**\$896**

(A9127) GST INC:

HP ProCurve 100-FX SC Transceiver

**\$714**

(A9128) GST INC:

## HP ProCurve Switch 4108GL

The hp procurve switch 4108GL bundle is a high performance, Layer 2 modular switch, for high port-density needs at the edge of the network. The chassis bundle provides 72 half/full duplex, 10/100 autosensing ports, with hp auto MDIX, transceiver module for uplinks and 4 free module slots. In addition, the switch offers built-in management (including SNMP and RMON) and fast path technology for wire-speed switching.



(C5871) GST INC: **\$17,969**

## HP NETSERVER E-200

The Server with the best price/performance value for small businesses.

Starts your small business off on the right Track. The HP NetServer E200 offers the best value-to-performance ratio of any major server supplier.

A desktop PC may do the job when you are starting out, but as your small business expands, it quickly out grows the ability to cut corners on something as fundamental as a server. And with the HP NetServer E200 HP leads the top tier server suppliers offering full server grade technology, functionality and performance for the price of a PC.

- Intel PIII 1GHz processor with 133MHz front side bus
- 128MB registered ECC RAM standard (expandable to 768)
- 9.1GB, 10,000RPM, 68-pin Ultra Wide SCSI HDD
- Four PCI, one ISA
- Integrated HP NetServer 10/100TX LAN adapter

(C5879) GST INC: **\$Call**

Rent 3 yrs - \$Call per week\* Call for long term \*rental pricing



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All systems include: 7 mass storage shelves (4 available after floppy, CD-ROM & 9GB disc), 5 expansion slots (4 PCI, 1 ISA combination), integrated 10/100 network interface, and easy set up CD.

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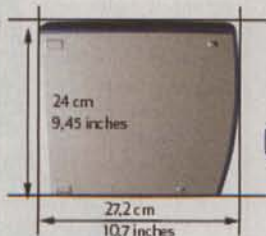
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# HP Desktops

## HP e-pc

**HOT  
NEW PRODUCT**



### Ultra-small, ultra-smart

The revolutionary e-Vectra measures only 9.5 inches (24 cm) high.



### Media Choice

Fast, slim  
CD and  
media-free  
models.



### Storage

Removable, generously  
proportioned hard disk  
drive for all user needs.



### Connectivity

Lockable USB,  
serial, parallel,  
PS/2 and LAN  
ports to fit your  
computing  
environment.



### Power

Powerful Intel Pentium III and  
Celeron processor  
configurations and generous  
RAM to suit any business  
application.



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Choose from a range of  
Microsoft operating  
systems including  
Windows 2000 to match  
your corporate standard.



### e-Diagnostics

The intelligent  
eDiagTools  
technology allows  
instant problem  
identification and  
web-enabled  
notification to HP or  
your support staff.

Processor:	hp e-pc C700	hp e-pc C700	hp e-pc PIII 866	hp e-pc PIII 866
SDRAM	64MB	128MB	128MB	128MB
Hard Disk	20G	20G	20G	20G
FDD	optional	optional	optional	optional
Monitor	no	no	no	no
CD - ROM	no	24x	24x	24x
OS	Windows '98	Windows '98	Windows 2000	Windows '98
Modem	optional	optional	optional	optional
Software	Word 2000	Word 2000	Word 2000	Word 2000
Part No.:	(B8730)	(B8731)	(B8732)	(B8733)
GST INC:	<b>\$1,328</b>	<b>\$1,499</b>	<b>\$2,058</b>	<b>\$1,899</b>
Rental:	<b>\$14.55</b>	<b>\$16.43</b>	<b>\$22.55</b>	<b>\$20.81</b>

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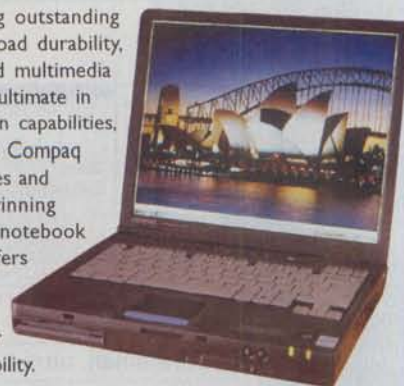
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Model:	Evo N150	Armada E500
Processor:	Intel® Pentium® III 800MHz	Intel® Pentium® III 850MHz
RAM:	64MB	128MB
Hard Drive:	15GB	20GB
DVD-ROM:	8x DVD	8x DVD
Modem:	56K	56K
LAN:	10/100	10/100
Screen:	14.1" CTFT	15" TFT
OS:	Microsoft® Windows® ME	Microsoft® Windows® 98 SE
Part:	(C4911)	(B1926)
RentSmart:	\$37.33	\$51.58
Price:	<b>\$3,995</b>	<b>\$5,659</b>

### COMPAQ NOTEBOOKS

Featuring outstanding on-the-road durability, enhanced multimedia and the ultimate in expansion capabilities, our new Compaq Evo series and award-winning Armada notebook range offers you the greatest in power & portability.



### COMPAQ iPAQ DESKTOP

New technology features are combined in its compact, sleek design; and it delivers new levels of product security. It is not only affordable to buy but also to run. Although sophisticated in its capabilities, the Compaq iPAQ has been created to deliver an unprecedented level of PC modularity.

- Intel Celeron 700MHz Processor
- 64MB 133MHz SDRAM
- Integrated Intel 3D Graphics
- 10GB Ultra ATA 100 Hard Drive
- Integrated AC97 Audio
- Integrated Intel Network Card
- Compaq Carbon Scroll Mouse
- Compaq Carbon Easy Access Keyboard
- Microsoft Windows Me

(B8286) GST Inc: **\$1,095**

OTHER  
CONFIGURATIONS  
ALSO  
AVAILABLE



### COMPAQ iPAQ STOWAWAY PORTABLE



(C0247) GST Inc:  
**\$255**

RentSmart:  
\$12.00 / week

Introducing the new Compaq iPAQ Stowaway Portable Keyboard, which will allow people to quickly and comfortably enter text into Compaq iPAQ pocket PCs, without having to carry around a full-size keyboard.

### COMPAQ iPAQ POCKET PC H3630 COLOUR UNIT



(A3737) GST Inc: **\$1,099**  
RentSmart: \$12.00 / week

### COMPAQ iPAQ POCKET PC'S

- Fastest PDA on the market - 206Mhz Intel StrongARM processor
- More memory - 32MB of storage for your files including MP3's, addresses, e-mails and attachments
- Most expandable - with the expansion jacket system you can add CompactFlash or PC card accessories and Wireless LAN, GPS Navigation Pack, Bluetooth Communication Packs and Cellular Technologies (GSM).
- Only PDA with reflective technology - viewable outdoors.
- Handwriting recognition, record voice notes, Windows interface.
- Software - Pocket Word, Pocket Excel, Pocket Internet Explorer 5.0, ActiveSync 3.1, Microsoft Outlook® 2000.

Also available:

#### Compaq

iPAQ H3660 - 64MB  
Colour Unit  
(C2139) GST Inc:  
**\$1,439**

#### Compaq

iPAQ H3130 - 16MB  
Mono Unit  
(B4505) GST Inc:  
**\$774**

### COMPAQ'S MICROPORTABLE PROJECTORS

#### COMPAQ MP1400

- 800 x 600 SVGA native display resolution and auto scales up to SXGA and Macintosh resolutions
- Increased light output of 700 ANSI lumens
- On-screen menu or adjusting tint, brightness, colour and many more image settings
- Operating noise less than 40 decibels
- Optional remote control/multimedia adapter with 8W Premier Sound speaker and video plug of VCR, DVD and camcorder inputs
- Only 1.9kgs
- 2 year warranty

RentSmart \$53.26 / week  
(A5430)  
GST Inc **\$5,843**



#### COMPAQ MP2800 - NEW!

- 1024 x 768 XGA display resolution
- Increased light output of 1000 ANSI lumens
- On-screen menu or adjusting tint, brightness, colour, keystone and many more image settings.
- Remote control/multimedia adapter with 8W
- Premier Sound speaker and video plug or VCR, DVD and camcorder inputs, USB port, DVI connector
- Operating noise levels less than 40 decibels
- Integrated zoom lens
- Only 1.36kgs
- 2 year warranty

RentSmart \$78.38 / week  
(B8669)  
GST Inc **\$9,179**



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## Complete Business Networking Solutions

THE WORLD'S MOST POPULAR SERVERS ARE  
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### ProLiant ML 330e

*The perfect first server for a business!*

- Delivers easy-to-manage file, print & Internet sharing
- Intel Pentium III 800MHz processor with 133MHz front side bus
- 64MB ECC SD RAM (expandable to 2GB)
- 6 Available PCI Expansion Slots
- 20GB ATA/1000 Hard Drive
- Include: Famous Insight Manager Software and SmartStart software
- 3 Year Limited Compaq Warranty

(C0645) GST INC: **\$1,699**

RentSmart: \$18.62/wk

### Small Business Budget Solution

PIII 800/20GB/128MB/  
TR-5 BackUp Drive/  
Windows 2000 Server

(C2925) GST INC: **\$4,295**

Optional Upgrade with  
SBS & an additional  
128MB RAM

(C2926) GST INC: **\$5,790**



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### ProLiant ML 350

*Offers the latest Technology with room to grow!*

- Ensures high availability for your business with hot-plug options
- Dual capable Intel Pentium III 933MHz & 133MHz front side bus
- 128 MB ECC SDRAM (Expandable to 2 GB)
- 9.1GB Wide-Ultra SCSI Hard Drive (Expandable up to 218GB)
- 6 Available PCI Expansion Slots
- Includes: Famous Insight Manager Software and SmartStart software
- 3 Year On Site, Next Business Day Compaq Warranty

(A8055) GST INC: **\$3,959**

RentSmart: \$37.50/wk

### Growing BusinessValue Solution

PIII 933/9.1GB/128MB/  
TR-5 BackUp Drive/  
Windows 2000 Server

(C2928) GST INC: **\$5,660**

Optional Upgrade with  
SBS & an additional  
128MB RAM

(C2930) GST INC: **\$7,155**



Microsoft  
Small Business  
Server 2000

Optional  
Upgrade  
with SBS &  
an additional  
128MB RAM  
GST INC:  
**\$1495**

For  
Microsoft  
SBS - Server  
Details,  
refer to:  
[ht.com.au/  
cat/microsoft](http://ht.com.au/cat/microsoft)

### ProLiant ML 370

*World's most popular server!*

- Constant uptime with hot-plug drives standard & power supply redundancy
- Dual capable Intel Pentium III 933MHz & 133MHz front side bus
- 28 MB ECC SDRAM (Expandable to 4 GB)
- Ultra2/Ultra3 dual-channel integrated SCSI controller (RAID upgradable)
- 6 Available PCI Expansion Slots
- Includes: Famous Insight Manager Software and SmartStart software
- 3 Year On Site, Next Business Day Compaq Warranty

(A6340) GST INC: **\$4,295**

RentSmart: \$40.14/wk

### A Scalable Performance Solution

PIII 933/256MB/  
3x18GB, RAID 5,  
12/24GB DDS-3  
DAT BackUp Drive/  
Windows 2000 Server

(C3639) GST INC: **\$9,885**

Optional Upgrade with  
SBS & an additional  
128MB RAM

(C3640) GST INC: **\$11,380**



ProLiant  
Server  
Bundle  
Terms &  
Conditions

Windows  
2000 SBS/  
128MB  
memory pack  
cannot be  
bought  
separately.

Bundle offers  
available until  
31<sup>st</sup> August  
2001.

## COMPAQ INSTALLATION & WARRANTY CAREPAQ UPGRADES :

#### Installation Carepaqs:

Installation of any above server  
Bundles and MS Server 2000:  
(C3719) GST INC: **\$195**  
Installation of any above server  
Bundles and MS SBS 2000:  
(C3721) GST INC: **\$995**  
Single Shared printer start up  
Installation:  
(C3726) GST INC: **\$195**

#### Warranty Enhancement Carepaqs:

3 Year, 4 Hour response,  
8hrs x 5 days on site warranty  
on ProLiant ML330 and  
ML 350 Server:  
(B2198) GST INC: **\$659**  
3 Year, 4 Hour response,  
8hrs x 5 days on site warranty  
on ProLiant ML370 Server:  
(99494) GST INC: **\$2,042**

#### Compaq Recover All Carepaqs:

(Warranty for peace of mind):  
Covers ProLiant Servers  
for protection from Fires,  
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ProLiant ML350 (Warranty)  
(C4283) GST INC: **\$160**  
ProLiant ML370 (Warranty)  
(C3724) GST INC: **\$500**

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## Sony - The leaders in visual display

### MONITORS

#### CPDE220 (17")

Flat Display Trinitron 16" viewable image, supports up to 1280 x 1024 @ 75 Hz, Complete On-screen Menus, Anti Reflective Screen Coating.



(B1831)  
GST INC

**\$715**

#### CPDG420 (19")

Flat Display Trinitron 18" viewable image, supports up to 1920 x 1440 @ 60 Hz, Complete On-screen Menus, Anti Reflective Screen Coating.



(B7964) GST INC

**\$1,259**

#### CPDG520 (21")

Flat Display Trinitron 19.8" viewable image, supports up to 2048 x 1536 @ 60 Hz, Complete On-screen Menus, Anti Reflective Screen Coating.



(B7966) GST INC

**\$2,099**

**4-WAY POWERED  
USB HUB BUILT-IN**

#### SDMN50 (15")

15" XGA TFT Active Matrix LCD Panel, Black Matte Finish, Bright Picture, Sharp Images - 300:1 Contrast Ratio 200 cd/m<sup>2</sup> Luminance / 0.297mm Dot Pitch, 1024 x 768 @ 75Hz, Wide Viewing Angle 140°, Stereo Speakers in Base, On-screen Digital Controls.



(97422) GST INC

**\$2,199**

#### SDMM51 (15.1")

15.1" XGA TFT Active Matrix LCD Panel. Sleek, Lightweight and Flexible Design with Zero Footprint New Improved Picture Quality, Fine .30mm Pixel pitch, Built-in stereo spkrs and head-Phone jack, Lt Grey/Dk Grey, Arm Mountable and Anti-theft lockable.



(B0916) GST INC

**\$1,769**

#### SDMM81 (18.1")

18.1" XGA TFT Active Matrix LCD Panel. Sleek, lightweight and flexible Design with Zero Footprint, new improved picture quality, fine .30mm pixel pitch, Built-in stereo speakers and headphone jack, Lt Grey/Dk Grey, Arm mountable and Anti-theft lockable.



(B8689)  
GST INC

**\$4,389**



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### CAMERAS

## Cyber-shot DSC-P30 Cyber-shot DSC-P50 Cyber-shot DSC-S75

#### Memory Stick Digital Camera 1.3 Megapixel

Memory Stick, InfoLithium compatible (NPFS11) 3 x Zoom (6x Precision Digital), Optical Viewfinder, 1.5" LCD, Email, TIFF, MPEG EX, Clipmotion, AF Illuminator, Video out, USB, 1280x960 resolution, MGI Photosuite(Win) VideoWave (Win)



(C2363)  
GST INC

**\$749**

#### Memory Stick Digital Camera 2.1 Megapixel

2.1 Mega Pixel, Optical viewfinder, MPEG Movie EX, Clipmotion, 6x Precision Zoom, e-mail mode, text mode, TIFF mode, Inbuilt flash, 4MB Memory Stick.



(C4274)  
GST INC

**\$949**

#### Memory Stick Digital Camera 3.3 Megapixel

3x Optical Zoom (6x Precision Digital), 1.8" Colour LCD, Optical Viewfinder, MPEG Movie EX function, AF Illuminator, Clipmotion, Built-in Flash with Red Eye Reduction, Carl Zeiss Vario Sonnar Lens.



(C4200) GST INC

**\$1,670**

#### Mavica FD75

#### Floppy Disk Digital Still Camera .35 Megapixel

3.5" 2HD Floppy, InfoLithium L (NPF330/NPF550), zoom, 2.5" LCD, 640 x 480 (0.35 Megapixel) Silver in colour.



(B8349)  
GST INC

**\$878**

#### Mavica FD92

#### Dual Media Digital Still Camera

Floppy Disk and Memory Stick Slot, 1.3 Megapixel, MPEG Movie Function, 8x Optical Zoom (16x Digital), USB Connectivity.



(B7969) GST INC

**\$1,520**

#### Mavica CD300

#### NEW CD-R/CD-RW Mavica Digital Still Camera

3.3 Mega Pixels, 3x Optical Zoom (6x Digital), Carl Zeiss Lens 3 Burst mode, Automatic Pop-Up Flash, USB Connectivity



(C4276) GST INC

**\$2,289**

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## Taking off in style. Landing with power.

### Sony VAIO R505 Series Notebook



(C3537) GST INC **\$5,199**

Pentium III 750 MHz  
128MB RAM  
15GB Hard Disk  
DVD ROM Drive

MagicGate Memory Stick Slot

Built-in Modem & Network  
Connector

12.1" XGA (1024x768) Display

3 USB Ports & 2 i-LINK Ports

Unique Jog Dial Control

Docking Station Included

Windows® Me



(C2156) GST INC

**\$5,899**

Pentium III 850 MHz  
128MB RAM  
20GB Hard Disk  
DVD/CDRW Drive



#### MagicGate Memory Stick

Weighing a tiny 4 grams, the 32MB/64MB/128MB Magic Gate Memory Stick holds text, music, PC Data, mpeg movies and photos. Magic Gate Memory Stick can handle both copyright protected and non protected content.

MSG32A

(C5925)

GST INC

**\$220<sup>SRP</sup>**

MSG64A

(C5926)

GST INC

**\$359<sup>SRP</sup>**

MSG128A

(C5927)

GST INC

**\$649<sup>SRP</sup>**

Built-in Camera

Unique Jog Dial Control

128MB RAM

15GB Hard Disk

MagicGate Memory Stick Slot

USB Port & i-LINK Interface

Windows® Me

### Capture the Moment



(C5159) GST INC

**\$3,799**



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for Locations

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# Magellan GPS Systems

## Magellan GPS Map Companion



(B7496)

## Magellan GPS Map Companion

\* refer to side bar for detail of GPS Map Companion clip image



\*Palm V series not included

(B7496) GST Inc:

**\$723**

Turn your Palm V or Vx handheld into a powerful navigation tool that can pinpoint your location to within 10m on Australian street maps. Just clip the GPS Companion onto your Palm V series handheld and the receiver pinpoints your location.

### Features:

- Powerful 12 parallel channel receiver with powerful tracking in most environments.
- Up to 10 hours on 2 AAA alkaline batteries.
- Compatible with most Palm software that access GPS
- Displays AMG/MGA position, Lat/Long, Elevation, Trip, Speed, Heading, Bearing, Odometer, Waypoints, Routes, GPS battery life and more!
- Weighs only 110gms.

## Magellan GPS 330



(C5893) GST Inc:

**\$849**

Boasting the most memory in its class, the Magellan MAP 330 is designed to meet the stringent navigation needs of the outdoor enthusiast and mobile professional who demand superior reliability and functionality. The built in 8 Megabyte base map includes worldwide political boundaries and Australian cities, highways, major roads, waterways and more!

### Features:

- Powerful 12 parallel channel receiver and super sensitive quadrifilar antenna for fast satellite signal locking and accurate tracking.
- Built in 8Mb map database displays major roads, highways, cities and other navigable details with advanced map database search.
- 8Mb of FLASH memory
- PC Upload/download capability for additional street detail via the optional MapSend Streets CDROM

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## Magellan GPS 320



(B7508) GST Inc:

**\$599**

The GPS 320 personal navigator will take you where you want to go. Its built-in database puts more than 15,000 cities and nautical navigation aids in the palm of your hand. Nine navigation screen's provide all the information you need on a high resolution, EL backlit display.

### Features:

Specifications as per Magellan GPS 315, plus:

- Built in Database of world wide cities and nav aids.
- Ships with PC/Power data cable.



(B7506) GST Inc:

**\$499**

## Magellan GPS 315

The GPS 315 is built to get you there and back, wherever you're going. Chart your bearing, heading, distance, speed and more with the help of nine easy-to-follow navigation screens. With the GPS 315, you can navigate to nearly 12,000 worldwide cities and record as many as 500 favorite locations for future return trips.

### Features:

- Powerful 12 parallel-channel receiver
- Built in database of worldwide cities.
- 12hrs of continuous battery life on two AA alkaline batteries
- 1200 point SmartTrack records your path; BackTrack brings you home again.
- Store 500 waypoints.
- NMEA data output and DGPS ready.
- Weatherproof, compact and lightweight.

## Optional Accessories for GPS 310, 315, 320 & 330



• Power data cable adaptor (B7519) GST Inc: **\$109**



• Power cable (B7509) GST Inc: **\$55**

• Vehicle Mounting Bracket (B7515) GST Inc: **\$105**

• Aquapac, clear plastic weatherproof case to hold both Palm with Companion Clip-On.

\*Magellan GPS Map Companion ONLY (C4290) GST Inc:

**From \$35**

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# Power Back Up = Power Protection

## ● APC Surge Arrest-PNote Pro®



Surge  
Arrest 5 Strip  
(A0098)  
GST INC  
**\$54**

An APC SurgeArrest is your guarantee that your hardware and valuable electronics are protected regardless of lightning strikes and everyday unexpected power surges. SurgeArrest also offers the best protection from line noise which can cause glitches and errors in electronic operations and computer data.

PNote Pro  
(99592) GST INC **\$46**

The SurgeArrest Notebook Pro Surge Protector provides the mobile notebook professional with advanced AC and telephone line protection. The unique, in-line design creates a compact, lightweight surge protector that is truly portable and appropriate for use in any country throughout the world. With built-in Excess Current Detection, the Notebook Pro warns you against potential modem damage. A Velcro mounting strap and 6 ft. telephone cord eliminate the need to carry any additional accessories.



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GST INC  
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(C5878)  
GST INC  
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650va  
(56231)  
GST INC  
**\$259**



APC  
Symmetra  
Power Array  
8kVA, exp. to  
16kVA  
(71087)  
GST INC  
**\$13,529**

So good we use  
it ourselves!

## ● APC Back Ups Pro® for Workstations

**Smart battery backup & high performance surge suppression for Windows 95 & NT PCs**

- PowerChute® Plus software lets your UPS shut down your applications gracefully in the event of an extended power failure
- Additional outlet for protection of printers
- Audible alarms
- Phone/modem protection
- User replaceable, hot swappable batteries



APC Back-UPS Pro **280si** (76636) GST INC **\$252**

APC Back-UPS Pro **420si** (76637) GST INC **\$339**

APC Back-UPS Pro **650si** (76638) GST INC **\$459**

## ● APC Smart-UPS Rack Mounts® for Servers

**Smart-UPS 700, 1000, and 1400 2U Rack Mounts**

Network power protection to increase availability of your system. APC Smart-UPS 2U Rackmount features include longer runtime to keep your system safe and a 2U design to save your valuable rack space by 30%. Hot swapping batteries is also now faster and easier with the replacement battery chassis tray.



APC Smart-UPS **2u700VA** (99595) GST INC **\$695**

APC Smart-UPS **2u1000VA** (99596) GST INC **\$1,012**

APC Smart-UPS **2u1400VA** (99597) GST INC **\$1,425**



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## Cost Effective PCs & Servers

### SLIM OFFICE



\*MONITOR NOT INCLUDED, ALL PICTURES  
FOR ILLUSTRATION PURPOSES ONLY

### THE IPEX SLIM OFFICE

A high performance, low profile, small form factor system designed to meet the needs of corporate users in the areas of expandability, value, security and ergonomics.

### IPEX MICRO OFFICE SYSTEM

Ipex Multimedia Kit allows the inclusion of optional speakers, amplifier with front headphone and microphone connection and Front USB ports.

### IPEX OFFICE SYSTEM

Provides 2x 5.25" and 2x 3.5" accessible and 2x 3.5" hidden bays. Includes Ipex Multimedia kit. Expansion card clamps, cabling conduits and optional IR Receiver.

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Not all  
items are  
in stock at  
all stores  
but can be  
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### MICRO OFFICE



### OFFICE

	SLIM OFFICE	MICRO OFFICE	OFFICE/GRAPHICS
PROCESSOR	C 766MHz	PIII 933MHz	P4 1.4GHz
RAM	64MB SDRAM	128MB	256 MB RDRAM
HDD	10GB	20GB	20GB
CD-ROM	52x	52x	No
LAN	Integrated NIC	10/100 NIC	10/100 NIC
DVD	No	No	Yes
OP System	Win 2000	Win Me	Win 2000
Rent*	\$16.43	\$17.80	\$27.31
GST Inc	<b>\$1,499*</b>	<b>\$1,624*</b>	<b>\$2,785*</b>
Part #	(C5937)	(C5928)	(C5930)
CRT Monitor	15"	17"	19"
Rent*	N/A	\$6.02	\$8.93
GST Inc	<b>\$410</b>	<b>\$550</b>	<b>\$815</b>
Part #	(C5931)	(C5932)	(C5950)

Ask  
About...



- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

## Server

Intel Server motherboard integrated into Ipex Duality tower or desktop case. Configuration load tested to customer requirements during manufacture.

Rackmount version also available (call for pricing).

### IPEX FILE / WEB SERVER

PROCESSOR	PIII 1GHz (dual capable)
RAM	256 MB/ 2GB Max
HDD	9.1 GB SCSI
CD-ROM	Yes
LAN	Integrated Intel Server Adapter
SCSI Controller	Dual channel Ultra II SCSI
Rent*	<b>\$29.37</b>
GST Inc	<b>\$2,995*</b>
Part #	(C5939)



\*MONITOR NOT INCLUDED

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4. If you are approved with RentSmart, your  
RentSmart account will be automatically set  
up in just minutes.

RentSmart will then send you your application  
to sign, and your equipment will be ordered.

Remember, renting is the cost-effective  
solution for businesses to get the  
technology they need to succeed.

Check out how little RentSmart costs:

Purchase Price (GST Inclusive)	36 Mths (p/week)	24 Mths (p/week)
\$1000	\$10.96	\$13.73
\$2000	\$21.92	\$27.46
\$3000	\$29.42	\$39.11
\$5000	\$45.57	\$62.07

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information phone  
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# Next Generation Backup Solutions

## media

- DLT Tape Media IIIXT  
15/30GB Tape  
(68362) GST INC **\$80**
- DLT Tape IV Media  
20/80GB  
(71231) GST INC **\$155**
- DLT Cleaning Tapes  
(97851) GST INC **\$93**
- Super DLT Media  
110/220 GB  
(B9825) GST INC **\$330**
- Exatape 112 - 8mm  
(C1976) GST INC **\$12**
- Exatape 160 - 8mm  
(C1980) GST INC **\$22**
- Exatape AME - 125m  
(C1986) GST INC **\$105**
- Exatape AME - 170m  
(77600) GST INC **\$170**
- Exatape AME 2-150m  
(C1989) GST INC **\$180**
- Exatape 8mm  
Cleaning Tape  
(C1982) GST INC **\$29**
- Exatape AME 18c  
Cleaning Tape  
(C1983) GST INC **\$36**
- Ecrix VXAI - M62  
12/24 GB  
(91103) GST INC **\$89**
- Ecrix VXAI - M107  
20/40 GB  
(C3945) GST INC **\$129**
- Ecrix VXAI - M170  
33/66 GB  
(91105) GST INC **\$197**
- Ecrix VXAI - 1m  
Cleaning Tape  
(91104) GST INC **\$102**

## Quantum



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NEW PRODUCT

### QUANTUM DLT TAPE DRIVES

- Quantum DLT8000/S internal 40/80 GB (82501) GST INC **\$6,390**
- Quantum DLT8000/ST external 40/80 GB (82502) GST INC **\$7,240**
- Quantum SDLT220/S internal 110/220 GB (B9821) GST INC **\$11,570**
- Quantum SDLT220/ST external 110/220 GB  
(B9823) GST INC **\$11,950**

## Quantum



### QUANTUM DLT 1 ECONOMY TAPE DRIVES

- 40GB native, 80GB compressed  
3-6MB sec sustained, that's 21.6GB/Hour  
Ultra Wide SCSI LVD interface  
Reads DLT4000 tapes (20/40GB Only)  
LINUX Approved  
Compatible with most common backup software  
Standard DLT form factor
- INTERNAL** (88037)  
GST INC **\$2,989**
- EXTERNAL** (88038)  
GST INC **\$3,650**

## Maxtor



### Max1394-40GB External Disk Drive

- 40 GB Raw Ultra ATA Disk, Firewire ready, or use PCI Card  
(B6511) GST INC **\$645**

### Max1394-80GB External Disk Drive

- 80 GB Raw Ultra ATA Disk, Firewire ready, or use PCI Card  
(B6512) GST INC **\$925**

### Max1394PCI Adapter Card for Windows 98/2000

- Dual 400 MB/sec Firewire Interface, Mac and PC Compatible,  
Plug and Play  
(B4383) GST INC **\$110**

## Ecrix



### VXA 1 TAPE DRIVE

- 33 GB Native, 66GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hr
- SCSI-2 and LVD models available in variety of case colours
- Variable speed operation matches data throughput to your computer
- LINUX and Apple Mac approved.
- Compatible with most backup software

- INTERNAL** (C1847) GST INC **\$2,170**
- EXTERNAL** (C1915) GST INC **\$2,615**

- EXTERNAL BUNDLE  
PACK** (B1856) GST INC **\$2,495**

## OVERLAND



### DLT1 Autoloader

- 400 GB native, 800 GB compressed capacity
  - DLT1 Single Tape Drive included
  - 10 tape capacity
  - Overland DLT reliability
  - LVD 68 pin SCSI interface
- Includes 1 data tape and cable  
20 GB/Hr throughput.  
Optional On-site warranty.
- (A0476) GST INC **\$9,800**



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18



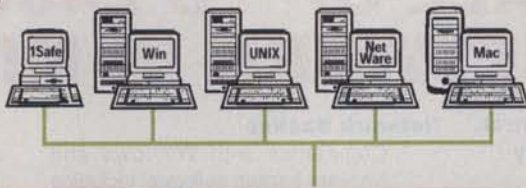
## Network storage you can use



### MaxAttach NAS 4100 File Server

- Windows, UNIX/Linux, NetWare and Macintosh file sharing
- NAS Powered by Windows operating system
- RAID Levels 0,1, and 5 data protection
- ADS/NDS/NIS Support
- SCSI port for Back-up
- No per-client license
- Up to 320 GB in 1U
- Gigabit Ethernet

**FILE SHARING:** MaxAttach NAS 4100 can be used for simultaneous multi-platform file sharing. File locking ensures that any file can be updated by only one client at a time. Clients and servers can be backed up to the MaxAttach file server using the included iSafe for MaxAttach software.



The new MaxAttach NAS 4100 file server delivers seamless integration. With a Windows Powered operating system, the NAS 4100 is network storage that you can manage with the tools you have now. From backup support, to device management, to directory services, the NAS 4100 is the new network storage solution that you already know how to use.

NAS 4100 **160GB**

(B9954) GST INC **\$6,950**

NAS 4100 **320GB**

(B9955) GST INC **\$10,318**



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1. Plug into AC power



2. Connect to Ethernet hub



3. Turn Snap Server on

## INSTALL UP TO 240GB ON YOUR NETWORK IN MINUTES!!!



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### Delivering Even Greater Control, Security and Functionality

#### Ease of Use

- Auto-sensing 10Base-T/100Base-TX
- Automatic recognition of network types/clients
- Supports DHCP, BOOTP and RARP
- Configuration via Web browser

#### Features

- Embedded OS (unlimited user license)
- Pentium-class processor
- Ultra ATA hard drives
- RAID 5, 1 or 0
- Easily supports 100 or more clients
- Disk space quota set by administrator
- Full functioning FTP server
- SNMP support

#### Compatibility

- Simultaneous support for Windows 2000, NT, Netware, UNIX, Linux and Macintosh networks, and clients across TCP/IP, IPX, NetBEUI and AppleTalk networks
- Complete NFS 3.0 protocol support, symbolic linking of files and directories, Network Lock manager and rpcinfo command support.

### Network Backup

- Compatible with Windows and Netware backup software, including Veritas Backup Exec, Computer Associates ARCserveIT and Microsoft backup software for Windows 95/98/NT/2000
- SMART predictive disk failure analysis

### Network Security

- Set access permissions at file and directory level
- Integrates with Microsoft Domain Controllers or local user list

### Guarantee

- 3-year parts and labour

### Price

- 20GB (C0034) GST Inc. **\$1,380**
- 40GB (C0035) GST Inc. **\$1,998**
- 80GB (C0036) GST Inc. **\$3,240**
- 160GB (C0037) GST Inc. **\$6,945**
- 300GB (C0038) GST Inc. **\$10,565**

**Snap!**  
server

The Industry Standard

Snap Servers are engineered for one purpose: file sharing. That's why they can be up and running on a LAN in just minutes! Snap Servers offer you the perfect combination of quick and easy installation when compared to an NT server. Snap Servers are pre-configured to work in all major network environments, which means you just plug it in and turn it on, with no network downtime.



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- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

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# Intelligent KVM Switches

**Control multiple PCs  
or network servers  
with a single monitor,  
keyboard & mouse**



**3 YEAR WARRANTY**

**ServerLink  
Infinity Range**

## What is a ServerLink KVM Switch?

The ServerLink range of Auto KVM switches allow you to take full control of multiple PCs or network servers with just one monitor, keyboard and mouse. There is no software to load – just plug in your computers, plug in your monitor, keyboard & mouse and you are ready to go. All ServerLink KVM switches are hardware only solutions, totally independent of software and network operating systems. This ensures hassle free installation and error free switching & booting.

**ServerLink Infinity  
Model SL-921**  
1 - Win NT Server  
2 - Unix Server  
3 - Mail Server  
4 - Novell Server  
5 - Finance Dept  
6 - Sales Dept  
7 - Internet Server  
8 - Linux Server  
F1-Help - F7-Move Ctr  
F5-Scan - Enter Select  
Esc-Exit - L3-Select  
PgDn-Setup

On Screen Display

- Select computers via On-Screen-Display or front panel
- Name computers for simple selection
- Mouse & keyboard emulation for flawless booting
- Scan Mode for periodic computer monitoring
- Standard cables used throughout
- Cascadable to control up to 256 computers
- 8 & 16 port models 19 inch rack mounted design
- Australian designed and manufactured



SL-221

## ServerLink to computer cable

Each end of  
the cable  
fans out into  
three  
connectors.  
2m cable  
for PS/2  
mouse,  
keyboard  
and monitor  
(63972)  
GST INC  
**\$27**

5m cable  
(63976)  
GST INC  
**\$59**

2m cable  
for  
AT/Serial  
mouse,  
keyboard  
and monitor  
(63974)  
GST INC  
**\$26**

5m cable  
(63977)  
GST INC  
**\$59**



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**SERVERLINK**  
INFINITY

**2 Port Model  
Now Available  
FROM  
\$270**

## PS/2 Computers Only

<b>SL-221</b>	2 Port ServerLink Infinity KVM Switch for PS/2 only	(B3047) GST INC <b>\$270</b>
<b>SL-221-P</b>	2 Port ServerLink Infinity KVM inc. 2 x 2m PS/2 cables	(B3048) GST INC <b>\$310</b>
<b>SL-421</b>	4 Port ServerLink Infinity KVM Switch for PS/2 only	(A9890) GST INC <b>\$330</b>
<b>SL-421-P</b>	4 Port ServerLink Infinity KVM inc. 4 x 2m PS/2 cables	(B2759) GST INC <b>\$425</b>
<b>SL-821</b>	8 Port ServerLink Infinity KVM Switch for PS/2 only	(97888) GST INC <b>\$984</b>
<b>SL-821-P</b>	8 Port ServerLink Infinity KVM inc. 8 x 2m PS/2 cables	(97889) GST INC <b>\$1,159</b>
<b>SL-1621</b>	16 Port ServerLink Infinity KVM Switch for PS/2 only	(97890) GST INC <b>\$1,672</b>
<b>SL-1621-P</b>	16 Port ServerLink Infinity KVM inc. 16 x 2m PS/2 cables	(97891) GST INC <b>\$2,019</b>

## PS/2 & AT/Serial Computers

<b>SL-401</b>	4 Port ServerLink KVM Switch for PS/2 & AT/Serial	(63724) GST INC <b>\$737</b>
<b>SL-801</b>	8 Port ServerLink KVM Switch for PS/2 & AT/Serial	(63777) GST INC <b>\$1,230</b>
<b>SL-1601</b>	16 Port ServerLink KVM Switch for PS/2 & AT/Serial	(63778) GST INC <b>\$2,069</b>

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## Everybody's Connecting

### Wireless Connectivity

The NETGEAR 802.11b wireless family allows small businesses to benefit from the productivity gains of an "Always-on, Always-connected" mobile workforce. The products are based on industry-standard 802.11b, so the customer is ensured interoperability as well as security, with WEP encryption. And since it's NETGEAR the products are backed with a 5 year Limited Warranty and Free 24x7 support.



**ME102** Wireless Access Point

(B9929) GST INC

**\$684**



**MA401** PCMCIA Adapter

(B9928) GST INC

**\$319**



**MA301** PCI Adapter Cradle

(B9927) GST INC

**\$118**

Enquire  
for  
pricing  
on  
Netgear  
10 and  
10/100  
Mbps  
hubs.



### Shared Internet Access

The NETGEAR routers offer the ability to connect to the internet easily using ISDN, analogue or Cable/DSL. All products support IP routing and offer NAT and DHCP for security and ease of set-up.

**RM356** Ethernet/56K Analog Router: Connects up to 4 PCs to the Internet using 1 phone line and 1 ISP account

(70197) GST INC

**\$549**

**RT 314** 4 Port 10/100 mbps switch with cable/DSL interface

(A8862) GST INC

**\$389**

**RT 311** 1 Port 10/100 mbps switch with cable/DSL interface

(97719) GST INC

**\$296**

**MR 314** Wireless NAT Router

(C2297) GST INC

**\$899<sup>RRP</sup>**

**FR314** 4 Port 10/100 mbps cable/DSL firewall router

(B6554) GST INC

**\$669**

**RP114** Web-safe Router

(C5592) GST INC

**\$Call**

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### Printer Servers



**PS 105** 10 Mbps Print Server,

(67225) GST INC

**\$238**

**PS 110** 10/100 Mbps Print Server, 2

parallel ports (67226) GST INC

**\$269**

**PS 113** 10/100 Mbps Print Server, 3

parallel ports (A3287) GST INC

**\$424**

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## Everybody's Connecting

### 10/100 Switching Solutions



**FS 105** 5 port 10/100  
autosensing switch  
(84722) GST INC **\$164**

**FS 108** 8 port 10/100  
autosensing switch  
(70905) GST INC **\$280**

**FS 116** 16 port 10/100  
autosensing switch  
(A5347) GST INC **\$549**

**FS 516** 16 port 10/100 auto-  
sensing and internal PSU/Vista  
(60522) GST INC **\$899**

**FS 524** 24 port 10/100 switch  
(77549) GST INC **\$999**

**FS 524S** 24 port  
10/100 switch - stackable  
(B6540) GST INC **\$1,539**

### Gigabit Switches



**GA 622T** 32/64 bit PCI  
gigabit network card  
(B9943) GST INC **\$405**

**GS 504T** 4 port 100/1000  
(Copper)  
(A1375) GST INC **\$2,205**

**GS 508T** 8 port 100/1000  
port  
(B9916) GST INC **\$2,709**

**FS 510T** 2 port 100/1000 with 8 10/  
100 ports (copper)  
(A1209) GST INC **\$1,789**

**FS 518T** 2 port 100/1000 with 16  
ports 10/100  
(A1374) GST INC **\$2,225**

**FS 517TS** 16 port  
10/100 stackable switch  
(C2299) GST INC **\$1,999<sup>RRP</sup>**

### Starter Kits



**SB 105** 10Mb Hub 2x10/100, PCI,  
cables, internet sharing software  
(A3293) GST INC **\$139**

**FB 105** 10/100M Switch 2x10/100,  
PCI, cables, internet sharing  
software  
(A3935) GST INC **\$229**

### Network Cards

**FA 311**  
Ethernet  
adapter 10/  
100 PCI  
(A1372)  
GST INC  
**\$40**

**FA 312**  
Ethernet  
Adapter  
(A1373)  
GST INC  
**\$53**

**FA 411**  
10/100  
Mbps PC  
Card  
(Without  
dongle)

(B9944)  
GST INC  
**\$120**

**FA 510**  
Network  
Card for  
Notebook PC  
(81319)  
GST INC  
**\$154**



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# The Future of USB is Here...

Check for latest prices & products!

## PDA ACCESSORIES

### F8E391

Universal PDA Case  
Finegrain Leather-Black  
(B6767)  
GST Inc:

**\$35**

Tan

(C4690)

GST Inc:

**\$35**

### F5U109

USB PDA Adapter  
(B6768)  
GST Inc:

**\$67**

### F3X1051-03

Hot Sync Cable for Palm III/VII  
(C4685)  
GST Inc:

**\$35**

### F8V7P001

Palm V Mobile Power Cord Car Charger, D/C  
(C4688)  
GST Inc:

**\$38**

### F8E708 4-in-1 PDA

Stylus Pen-Stylus Tip, Red, Black, 0.5mm Pencil  
(C4694)  
GST Inc:

**\$45**

### F8E709

PDA Stylus Pens- 3 pack, Palm III/VII  
(C4695)  
GST Inc:

**\$17**

## USB Hub

### F5U101

A Belkin USB 4-port hub! This compact modular hub allows you to connect 4 USB devices to a single USB port, and it fits almost anywhere. Take advantage of full Plug-and-Play capability to make installation a breeze.

(96865) GST Inc: **\$89**



## USB VideoBus II

### F5U208

You create the show yourself with your PC & camcorder merged into a desktop video studio by the Belkin USB VideoBus II. The Belkin USB VideoBus II, complete with MGI VideoWave III SE software, gives your PC the power to make stunning movies & more!

(B4412) GST Inc: **\$145**



## FireWire/USB ComboCard

### F5U008-PC

Save your computer's PCI slots by installing two of the fastest technologies in one slot. The Belkin ComboCard gives you the flexibility to configure a computing environment that truly maximises your use of the newest technologies. Add two external and one internal FireWire ports, plus two additional USB ports with a simple, slide-in installation. Also capture digital video on your PC and edit using the included MGI Video Wave III SE and PhotoSuite III SE software.

(C3981) GST Inc: **\$249**

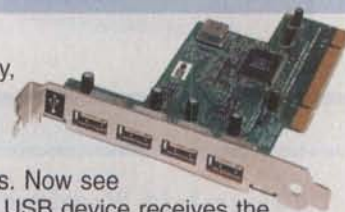


## USB QuadraBus

### F5U006-UNV

With the power of QuadraBus™ technology, the Belkin 4-Port PCI Card delivers 12Mbps of bandwidth to each of its four USB ports. Consider how sluggish four connected devices will run sharing 12Mbps. Now see their performance rise four-fold once each USB device receives the full 12Mbps. While other 4-Port PCI cards divide bandwidth, the Belkin 4-port PCI Card multiplies it.

(B2940) GST Inc: **\$119**



## Belkin Has All Of Your Mobility Solutions!

## Firewire CardBus

### F5U512

Brings the revolutionary speed of FireWire to your notebook computer. Simply slide the card into your laptop's available 32-bit CardBus Type II slot, and get two additional IEEE 1394 ports. Maximise your use of ultra-fast disk, Zip and optical drives, scanners, printers and other peripherals. MGI software incl.

(B6757) GST Inc: **\$191**



## MiniSroller

### F8E841-BLK

Smaller than the standard mouse, the MiniSroller™ is perfect for travelers. No bulky mouse taking up prime space in your notebook bag. USB or PS/2 compatible, it features 8-directional scrolling and one-touch zoom control. It works with Windows™ 95, 98, Windows NT and W2000.

(C3979) GST Inc: **\$29**



## Bridge St Laptop Bag

### F8E158

Roomy enough to hold today's large screen notebooks, Belkin's Bridge Street laptop case includes a three-section file holder; external file pocket; and extra storage for computing accessories. Also available in Leather, or Ballistic Nylon.

(97271) GST Inc: **\$85**



## Don't Forget...

## USB Cable

### F3U133

A Belkin Gold Series USB device cable will keep those dream machines error free. Features high performance 20-gauge power wires & Gold Plated connectors which allow you to maximize the full potential of USB.

### USB Device Cables

A-B, 1.8m - (96893) GST Inc: **\$12**

A-B, Gold 1.8m - (96875) GST Inc: **\$17**

A-B, 3m - (96876) GST Inc: **\$24**

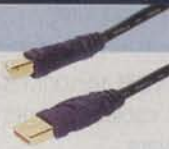
A-B, Gold 3m - (A7753) GST Inc: **\$29**

### USB Extension Cables

Male-Female, 1.8m - (96895) GST Inc: **\$14**

Male-Female, Gold 1.8m - (96878) GST Inc: **\$19**

Male-Female, 3m - (96879) GST Inc: **\$22**



\*Also available in colors: tangerine, blue, grape, lime, & strawberry

## Printer Cable

### F2A046

This Gold Series Parallel Printer Cable links your IEEE 1284 printer with a Centronics 36-port to your PC with a DB25 port. Featuring Gold plated connectors for maximum conductivity and corrosion protection.

### IEEE 1284 Parallel Printer Cables

A-B, 3m - (96929) GST Inc: **\$35**

A-B, Gold 3m - (96930) GST Inc: **\$45**

A-B, 1.8m - (96927) GST Inc: **\$22**

A-B, Gold 1.8m - (96928) GST Inc: **\$29**

A-B, 6m - (96932) GST Inc: **\$56**

A-B, Gold 7.5m - (96934) GST Inc: **\$69**



## Firewire Cable

### F3N400

A high-speed serial bus that bridges the world of consumer electronics and computers. The IEEE 1394 FireWire® Compatible Cable attaches your PC or A/V device to your computer.

### FireWire Compatible Cables 1.8m

6-Pin to 6-Pin Cable - (A7782) GST Inc: **\$39**

6-Pin to 4-Pin Cable - (A7802) GST Inc: **\$49**

4-Pin to 4-Pin Cable - (A7783) GST Inc: **\$49**

### FireWire Compatible Cables 4.2m

6-pin to 6-Pin Cable - (A7813) GST Inc: **\$69**

6-pin to 4-Pin Cable - (A7812) GST Inc: **\$45**

4-pin to 4-Pin Cable - (B2308) GST Inc: **\$45**



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# Complete sharing solutions from Belkin

## Desktop Network PCI Cards

The Belkin Desktop Network PCI Card for PC computers is the best solution for connecting your desktop PC to a cable or DSL Internet modem or building a 10/100 Base-T Ethernet network.

### F5D5000

10/100Mbps  
PCI NIC

(C5581) GST Inc: **\$32**

### F5D5020

10/100Mbps  
PCMCIA NIC - 16 Bit

(C5583) GST Inc: **\$134**

### F5D5010

10/100Mbps  
CardBus NIC - 32 Bit

(C5582) GST Inc: **\$149**



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## Network Hubs and Switches

### F5D384



F5D384- 10BT 5-Port HUB

(C5584) GST Inc: **\$66**

### F5D386



F5D386- 10/100BT 5-Port Switch

(C5585) GST Inc: **\$194**

F5D387- 10/100BT 8-Port Switch

(C5586) GST Inc: **\$294**

## Network Starter Kits

### F5D380



F5D380- Home starter kit

(C5587) GST Inc: **\$74**

### F5D381



F5D381- Pro Network kit

(C5588) GST Inc: **\$164**

F5D382- Mobile Network kit

(C5589) GST Inc: **\$134**

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## Omniview KVM Products

Belkin KVM Switches allow a keyboard, video monitor and mouse to control multiple computers- from 2 to 256.

### F1D102-AUS

### F1D104-AUS



\*D.C.= Daisy Chainable

F1D102-AUS- 2 Port KVM Switch, \*D.C.

(B6748) GST Inc: **\$294**

F1D104-AUS- 4 Port KVM Switch, \*D.C.

(96915) GST Inc: **\$433**

F1D104-USB-AUS- 4 Port USB  
KVM Switch

(C4661) GST Inc: **\$489**

F1D201-AUS- 2 Port Reverse KVM Switch

(C4662) GST Inc: **\$319**

## Omniview Pro KVM Products

### F1D104-OSD-AUS

### F1D108-OSD-AUS



F1D104-OSD-AUS- 4 Port KVM Switch

(A7797) GST Inc: **\$789**

F1D108-OSD-AUS- 8 Port with On-screen display

(A7798) GST Inc: **\$979**

F1D116-OSD-AUS- 16 Port with  
On-screen display PS/2 only

(C4663) GST Inc: **\$1,849**

F1D208-OSD-AUS- Matrix 2X8 with  
On-screen display

(C4664) GST Inc: **\$1,949**

## Omniview KVM Adaptors

Convert standard PS/2 Keyboard, mouse and video signals. Allow Sun users to use the Belkin Omniview™, Omniview™ PRO, Omniview™ SE, or OmniCube™ KVM switches.



### F1D082

PS/2 Sun Adapter (96911) GST Inc: **\$344**

## Omniview KVM Accessories

### F1D103- Rackmount Kit

(C4666) GST Inc: **\$95**

### F1D084- CAT5 KVM extender up to 150m

(C4667) GST Inc: **\$779**

### F1D087- Keyboard/Mouse extender

(C4668) GST Inc: **\$124**

### F1D088- Monitor extender

(C4669) GST Inc: **\$124**

### F1D089- Keyboard splitter

(C4670) GST Inc: **\$124**

### F1D090- Mouse splitter

(C4671) GST Inc: **\$124**



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needs!

## Omniview PS/2 KVM Cables

The easiest & neatest way to connect all your computers and servers to your PS/2 & USB KVM switches, providing image clarity for high-resolution applications.

### F3X1835-06-GLD

All-in-one PS/2 Gold Series Kit, 1.8m

(C4674) GST Inc: **\$59**

F3X1835-10-GLD- All-in-one PS/2 Gold  
Series Kit, 3m

(C4089) GST Inc: **\$94**

F3X1835b15-GLD- All-in-one PS/2 Gold  
Series Kit, 4.5m- bag pack only

(C4676) GST Inc: **\$94**

F3X1835b25-GLD- All-in-one PS/2 Gold  
Series Kit, 7.5m- bag pack only

(C4677) GST Inc: **\$107**

## Omniview USB KVM Cables

F3X1962-06- All-in-one USB Pro Series  
Plus Kit, 1.8m

(C4680) GST Inc: **\$37**

F3X1962-10- All-in-one USB Pro Series  
Plus Kit, 3m

(C4681) GST Inc: **\$64**

F3X1895-06-GLD- All-in-one USB Gold  
Series Kit, 1.8m

(C4682) GST Inc: **\$74**

F3X1895-10-GLD- All-in-one USB Gold  
Series Kit, 3m

(C4683) GST Inc: **\$74**

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**See Page 2  
for Locations**



## Small-Medium Business Networks

Web Direct

See Web Direct Link

(at top of page) for more products and latest info!

For all your small to medium business and home network needs please call for more information and pricing. We have an extensive range of fantastic D-Link products on our database.

### DWL-1000AP

D-Link Air Access Point

Fast 11 meg Performance. Build The Size of Your Wireless Network, or Extend Your Existing Wired Network.

**NEW**  
Wireless  
TECHNOLOGY



(A9251) GST Inc: **\$975**

### DI-804

Cable/DSL Internet Gateway Firewall/Switch

- Integrated firewall
- Configurable via Web Browser / Wizard
- 4 port 10/100 Mbps Ethernet Switch
- Broadband Cable or ADSL support
- Supports DHCP and NAT
- Supports automatic login to Bigpond Cables



**NEW**  
PRODUCT

(C2361) GST Inc: **\$389**

### DKVM-8

8 Port Keyboard, Video and Mouse Switch

"Easy to use, powerful, and scaleable KVM solution" • Controls 8 different server PC's w/ keyboard • Utilizes advanced microprocessor emulation, 2 sets of cables, user friendly interface.



**NEW**  
PRODUCT

(B2656) GST Inc: **\$867**

### DWL-120

D-Link Air 11Mbps Wireless LAN USB Adapter

The DWL-120 is a high-performance 11Mbps Wireless USB Network Adapter. The DWL-120 wireless adapter allows you to share hard disk drives, DVD/CD-ROM drives, Zip drives, printers and provides shared access to an analogue, Cable, or DSL modem for Internet access.



**NEW**  
Wireless  
TECHNOLOGY

(A8487) GST Inc: **\$349**

### DES-1008D

8 Port Fast Ethernet Switch

The D-Link DES-1008D is a powerful desktop Dual Speed 8-port 10/100Mb Ethernet/Fast Ethernet NWay auto negotiating Switch.



(98254) GST Inc: **\$239**

### DES-1016R

16 Port Switch for Workgroups

Built with advanced functions, these switches are designed for workgroups with advanced requirements. Powerful yet easy to use, they allow users to simply plug any port to either a 10Mbps or 100Mbps node to multiply bandwidth, boost response time and satisfy heavy load demand. Rack mountable.



(98255) GST Inc: **\$859**

Description	Part #	GST Inc
D-Link DP-303 10/100 Print Server (3xParallel Port)	(A8876)	<b>\$319</b>
D-Link DU-560M External V.90 56K Voice/Fax/Data Modem (USB)	(98261)	<b>\$105</b>
D-Link DFM-560I Internal PCI V.90 56K Voice/Fax/Data Modem	(74361)	<b>\$69</b>
D-Link DES-3225G 22+2 port 10/100Mbps Mang Switch W/ V-Lan	(90755)	<b>\$1,974</b>
D-Link DFE908DX 8 Port 10/100Mbps Dual Speed Hub	(B7830)	<b>\$289</b>
D-Link DFE-916DX 16 Port 10/100Mbps Dual speed hub	(87207)	<b>\$549</b>
D-Link DFE2624x24-port 10/100Mbps Stackable Dual Speed Hub	(98307)	<b>\$1,155</b>
D-Link DP-602 2 Port Internet Network Server	(81535)	<b>\$379</b>
D-Link DFE-530TX PCI-Bus 10/100Base TX Fast Ethernet Adapter	(62956)	<b>\$41</b>

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## Home Networking & Digital Camera

**NEW**

### DFE-910

#### Performance Network Kit

Contains, 2 x 10/100 Mb PCI Network Adapters, 1 x 5 port 10/100 Mb Switch, cables, internet sharing software and games.

(88060) GST Inc: **\$284**



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### DSC-350

#### Dual Mode Digital Still Camera

Multi-purpose 350k Digital Camera. Record up to 145 still images or 4.5 minutes of video. Max. resolution 1024 x 768. Up to 30 fps at 640 x 480 resolution in WebCam mode. 8Mb of flash memory. Bundled software and accessories.



(B3268) GST Inc: **\$312**

### DSB-C300

#### USB Digital Video Camera

This WebCam is a high resolution USB digital video camera. The DSB-C300 supports video with 64 million colours at 30 frames per second and 300k resolution using the high bandwidth of USB interface, and advanced light-sensing CMOS technology. As a fully contained unit, no video capture card or additional hardware is necessary.

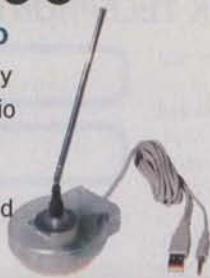


(C2364) GST Inc: **\$118**

### DSB-R100

#### USB PC Radio

The DSB-R100 provides an easy way to enjoy record and playback FM radio programs. It also supports a flexible tuner function for WAV and MP3 formats, SKIN, audio visualization and Winamp compatible plug-ins.



(C2365) GST Inc: **\$59**

### DSB-V100

#### USB Digital Video Capture Device

Allows a standard VHS camcorder to be connected to a PC. With both S-Video and RCA video input, the DSB-V100 allows the video stream from a video camcorder, VHS or Television to be directly provided to the USB Bus. The unit simply attaches via a standard USB type A connector to a PC or downstream USB hub.



(C2366) GST Inc: **\$159**

### DSS-5+

#### 5Port 10/100 Mbps Dual Speed Switch

5 port 10/100 Mbps Dual Speed Switch with 5 x RJ-45 ports. Plug-and-Play installation, designed for Gaming, Multimedia and Performance Users.



(89269) GST Inc: **\$179**

### DFE-902

#### Gaming Network Kit

The network kit is for 2 users (peer to peer) the gaming network kit contains, 2 x 10/100Mb PCI network card, 1 x 20' Cat.5 UTP Cross-over Cable, diskette with software drivers.



(C2367) GST Inc: **\$99**

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Not all items are in stock at all stores but can be ordered!

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# Connectivity where & when you need it

## WORK AND PLAY WHEN AND WHERE IT'S MOST CONVENIENT

This gateway lets your whole family share Internet access, personal files, and resources with or without wires. Designed for cable, DSL, or ISDN users, it works with the 3Com wireless LAN, or any other Wi-Fi-certified PC Card or PCI card to provide secure, reliable connections throughout your home.

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- Wi-Fi certification ensures multivendor interoperability

3Com® Home

Wireless Gateway

(B7460) GST INC **\$780**



Web Direct

See Web Direct Link

(at top of page) for more products and latest info!

## MOBILE CONNECTIVITY FOR NOTEBOOK PC USERS

For "wired-like" network performance without the wires, choose a 3Com® 11 Mbps Wireless LAN PC Card with XJACK® antenna. Take your notebook anywhere, and connect instantly and securely to any Wi-Fi-compliant device or network without additional configuration.

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- Dynamic rate shifting adjusts connection speeds for more reliable connections
- Auto Network Connect with DHCP support keeps mobile users connected - even while roaming
- Ad hoc support allows for simple peer-to-peer wireless networking
- Dynamic Security Link and 40-bit encryption allow you to exchange information in full privacy
- Wi-Fi certification ensures multivendor interoperability

3Com® 11Mbps Wireless LAN

PC Card with XJACK® Antenna

(C2415) GST INC **\$Call**



## IMPLEMENT NETWORK TELEPHONY TODAY?

3Com introduces new OfficeConnect Dual Speed Switches that have extended functionality and are now even more affordable.

OfficeConnect's high quality, reliable Dual Speed Switches have lower prices and new features which reinforce 3Com's commitment to radical simplicity and value.

The addition of priority queuing makes the switches "voice-ready" which enables customers to implement Networked Telephony today or tomorrow. No other vendor offers this type of flexibility for a small business applications.

The new Auto MDI/X feature simplifies the installation process by automatically adapting to any type of twisted pair Ethernet cable and customers get a lower price and more ports with the new OfficeConnect Dual Speed Switch 5 and Dual Speed Switch 8.

3Com® OfficeConnect

Dual Speed Switch

(C3984) GST INC **From \$259**



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This plug-and-play switch is the lowest cost entry level 3300 switch. 10/100 autosensing adjusts automatically to the speed of the attached devices. Mix and match with other 3Com® SuperStack® switches for the combination that suits you best.

- Works with existing SuperStack Switch 1100s and Switch 3300 to protect your investment
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- Includes 3Com® Network Supervisor software for optimal management
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- Dual queues help prioritize multimedia traffic
- Multicast filtering using IGMP snooping/GMRP optimizes bandwidth for video traffic

3Com® SuperStack®

3 Switch 3300

(B4495) GST INC **\$2,359**



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28



## Netcomm - Smart sharing solutions

### Compact Flash Modem

56K FaxModem for PDA's and Notebooks With PCMCIA adapter



**TWICE THE  
VALUE!!**

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Now you can stay in touch wherever you are – with the CompactFlash 56K FaxModem for your Handheld PC, palm-size PC or PDA. All you need is a CompactFlash slot, telephone line and be running Windows CE 2.0 or 3.0 and you're away.

- Ø Supports CompactFlash I/O type (CF+) and PCMCIA interface
- Ø Controller-based (Hardware) modem: ITU V.90 56kbps
- Ø Fax: EIA-578 Class I and II function, data rate up to 14,400bps
- Ø Supports Video conference: ITU V.80
- Ø Error correction: ITU-T V.42, MNP 2-4
- Ø Data compression: ITU-T V.42bis & MNP5
- Ø Supports Windows 95, 98, ME, 2000, NT4.0, Windows CE 2.0, 3.0



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Safe, Shared Internet Access and Easy Networking – Now and Tomorrow

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**Router, Hub and FireWall All-In-One!**

- Ø Shared Internet gateway – all your PCs can access the Internet via a single ISP account.
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- Ø Protect against internet hackers with built-in firewall.
- Ø Create or expand a network – from 2 to 253 users.
- Ø Dial-in remote access to network.
- Ø Easy Web-based configuration.
- Ø Increase productivity by sharing files and printers.
- Ø Limit individual user access to Internet services.
- Ø Embedded Linux for increased functionality and compatibility.
- Ø Supports xDSL, Cable, ISDN, Analog Modem



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### Smart i-Share 56

Where ever two or more PCs are gathered...

If you have more than one PC, you're going to love Smart i-Share - The Smart Internet Sharing Solution!

**THE SMART INTERNET  
SHARING SOLUTION**



(A8868) GST Inc: **\$454**

**Internal router** Allows 2 or more users to share one modem, Internet account and phone line. Simultaneous, dial-on-demand Internet access.

**Integrated Ethernet hub** Networks 2 or more PCs together for file and printer sharing.

**Integrated firewall** Helps prevent unauthorised users from accessing your network. Allows you to control employees' access to Internet and audio / video.

**Extra serial port** For easy expansion to accommodate an additional modem or ISDN TA. Can be connected to an existing network to provide cost-effective, multiple Internet and email access.

**Embedded Linux open source firmware** Enables custom configuration for your network.

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### Intra Internet access and remote dial-in solutions by Netcomm.

NetComm's INTRA 2, INTRA 4 and INTRA 8 family of PCI card modems connect your office computer or network to the outside world via multiple phone lines. Combined with off the shelf remote access software, INTRA provides a secure and seamless connection enabling remote users to interact online with you by remote login, by file transfer or by remote network connection.

Onboard dedicated acceleration hardware gives the highest throughput while placing minimum load on your server's processor. Easy to install! You just simply connect your computer and network directly to the phone lines - no fuss, no hassles. All this using only 1 IRQ address.



(A8858) GST Inc

**\$472**

NETCOMM INTRA 2



(65782) GST Inc

**\$1,108**

NETCOMM INTRA 4



(90426) GST Inc

**\$1,754**

NETCOMM INTRA 8

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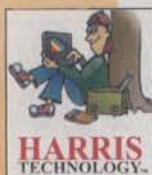
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## SWANNSMART TURBO

(B1846) GST INC **\$145**

56K V.90 External Voice/Fax/Data Modem

- Intel modem chipset
- Crystal clear hands free voice transfer
- Includes WebWorks 2000 CD ROM
- 30 Day Swann Satisfaction Guarantee
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## SWANN SPYCAM

(A8661) GST INC **\$139**

Miniature Video Camera

- Lost cost security solution
- Tiny size for undetected surveillance
- Easy installation
- Connect to a TV or VCR
- 1 year "Hassle Free" warranty



Size comparable to  
a 10 cent piece!



## SWANN SPEED DEMON

(87970) GST INC **\$105**

56K V.90 External Voice/Fax/Data Modem

- Best value for money
- Speed and reliability
- Includes software and cable
- Easy to use
- 1 year "Hassle Free" warranty



## SWANNSMART II PCMCIA

(B3314) GST INC **\$182**

56K V.90 PCMCIA Modem

- Includes WebWorks 2000 CD ROM
- Fax and Data software included
- Fast & Reliable Swann modem
- 30 Day Satisfaction Guarantee
- 5 year "Hassle Free" warranty



## SWANN WIRELESS GUARDIAN

(C5593) GST INC **\$349**

AV Monitor & Camera

- Monitor children, workplace or home security
- Completely wireless system for portability
- Infrared LEDs for night vision
- Battery or mains powered
- 1 year "Hassle Free" warranty



## OPTI-GLO MINI

(C5594) GST INC **\$49\***

Optical USB Mouse

- Optical sensor (no mouse ball) for superior performance
- Vertical and horizontal scroll for easy Internet navigation
- Full featured customisable software
- Available for PC and Mac
- 1 year "Hassle Free" warranty



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with 2 dozen  
games plus  
a daily  
crossword  
puzzle!

(C4291)  
GST Inc:  
**\$23**



## Quicken CashBook

CashBook is a single entry cash accounting package for small businesses. Features include:

- Producing quotes, work orders and invoices
- Storing customer and supplier records
- Managing work in progress and updating job
- Accounts receivable & payable tracking record
- GST management for tracking inputs and outputs for the relevant tax codes (except Wine Equalisation Tax)
- Producing the information needed for Business Activity Statements
- Tracking bank balances and printing cheques
- Up to 79 different financial reports and graphs

(A1775)  
GST Inc:  
**\$179**



## Quicken QuickBooks 8

QuickBooks offers the ability to customise, such as choosing cash only or accrual double entry accounting. Keep track of your company's bank balances, loans and other finances, calculate charges on overdue payments, monitor unpaid bills, write and print cheques, manage inventory and code each and every transaction you make, making it easy to manage the GST. Productivity gains will be augmented with up to 79 different financial graphs and reports. Additionally QuickBooks now incorporates QuickBooks Online Banking, Australia's first fully integrated online banking interface.

(C2379)  
GST Inc:  
**\$224**



## Quicken Personal Plus

Personal Plus monitors your bank accounts, savings and investments, plus it also tracks credit cards, mortgages, loans and superannuation. You can actively monitor your share portfolio and update the value of your portfolio via the Internet. Personal Plus will even alert you when your preset stock price is reached! Other features include the ability to:

- Track GST - for personal transactions only
- Keep tax records automatically
- Easily convert files for your accountant
- Handle multiple currencies
- Oversee budgets and forecast future account balances

(A1774)  
GST Inc:  
**\$119**



## QuickBooks PRO with Payroll 8

QuickBooks PRO with Payroll 8 includes all the features of QuickBooks PRO 8 plus integrated payroll management. It can be used for more than one business with unlimited employees, managing all their details including tax file no, bank details, pay, deductions, annual and sick leave. Your payroll is processed in flexible pay periods and automatically prints pay slips with the push of a button. QuickBooks with Payroll 8 then transfers pay, superannuation, taxes and any group certificates electronically to banks, super funds and the ATO, transferring all payroll information directly into your company's accounts.

(C2381)  
GST Inc:  
**\$694**

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**30**

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## SYMANTEC

Great PC Security Utilities for  
your home & office. **Page 60**

## IOMEGA

Smart Storage Solutions.  
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## KODAK

NEW DX3500: 2.2 Mega Pixel  
Digital Camera. **Page 41**

## SONY

Monitors, Cameras & Notebooks.  
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**Pages 54 & 55**

15" CRT Monitor

(C5931) GST INC: **\$410**



**Slim Desktop PC**

\*Monitor not included

(C5937) GST INC:

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9am - 4pm Saturday & Sunday

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Cust. Service:  
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Delivery times quoted by sales staff are our best estimates based on information received from the manufacturers. These estimates are offered as a guide only.

Under 3Kg: \$10  
3Kg - 10Kg (e.g printer): \$17  
Over 10Kg (e.g. system): \$33



## COLES MYER SHAREHOLDERS:

receive 3% discount on most products, but specifically not on:  
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## Pricing

All items in this publication have been included in good faith on the basis that the goods, as described, will be available at the time of sale. A failure by supplier to deliver in accordance with sample, description or at all or other unintentional causes may result in some lines being unavailable. Display accessories shown in photographs throughout this publication are not included in the price. Whilst every care has been taken to ensure accuracy in this catalogue, we reserve the right to change incorrect prices resulting from a printing or typographical error. Every effort has been made to ensure that Harris Technology's suppliers maintain their prices, so that Harris Technology can supply products to you at the prices advertised in this catalogue. Prices quoted are correct at the time of publication and are subject to change without notice due to matters such as currency fluctuations affecting our suppliers. Harris Technology publishes price changes both immediately on its website [www.ht.com.au](http://www.ht.com.au) and by public notices published on the first Tuesday of each month in The Australian.



## Multimedia: DVD-R, DVD-ROM & BLANK MEDIA

### Pioneer DVR-A03 DVD-R/RW DRIVE

One drive...  
One complete  
recording solution

#### Features

##### Writes:

- DVD-R (2x)
- DVD-RW (1x)
- CD-R (8x)
- CD-RW (4x)

##### Reads:

- DVD-ROM, DVD-Video,
- DVD-R, DVD-RW,
- CD-ROM, CD-R, CD-RW,
- CD-TEXT, Photo CD, Audio CD

#### Includes

- 2 x DVD-R Media
- 5 x CD-R Media
- SONIC DVD Authoring Software
- VOB DVD/CD Writing Software
- STAEDTLER LUMOCOLOR pen
- Power DVD software decoder



NEW

**\$2,078**

DVR-A03 (C3847) GST Inc:



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Direct

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Web  
Direct  
Link

(at top of page)  
for  
more  
products  
and  
latest  
info!

### Pioneer 16x DVD-ROM Upgrade Kit with Hardware Decoder

- Slot loading 16X drive (40X for CD) with installation

accessories • VideoLogic MPEG2 Decoder Card providing output for External Video & Dolby • Digital (5.1) Audio • Includes 2 DVD-ROM games (Baldur's Gate & Blade Runner) • Bonus 5 DVD movie rental vouchers from Video Ezy valued at \$30 • 2 Year Warranty

DVD-A05SKIT (A4327) GST Inc: **\$449**



### Pioneer 16x DVD-ROM Upgrade Kit with Software Decoder

- Slot loading 16X drive (40X for CD) with installation accessories • Power DVD Software Decoder • Bonus 5 DVD movie rental vouchers from Video Ezy valued at \$30 • 2 Year Warranty

DVD-A05SDXE (B0750) GST Inc: **\$274**



**BONUS  
DVD-ROM GAME  
(worth \$90)**

### Pioneer DVD-R Media

- Jewel Case • Memory-capacity of 4.7GB • Suitable for DVD Video & Data backup • Playable on both DVD-Video players & DVD-ROM drives • Commercial and Home DVD-Video production • Large sized data archive storage (not for use with Pioneer DVRS201 authoring drive)



DVS-R470SDF (B9971) GST Inc: **\$29**

DVS-RP470SDF (C2322) GST Inc: **\$26**

• White printable version

### Pioneer DVD-RW Media

Rewritable DVD media: Jewel case: Memory capacity of 4.7GB: Suitable for DVD video & data: (not for use with Pioneer DVR-S201 authoring drive, does suit Apple G4 "Superdrive")



DVS-RW470SD

(C2326) GST Inc: **\$59**

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## Backup and Portable Storage

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**Slim-line PC Card CD-ROM Drive**

"Add a CD-ROM to your Laptop!"



This 24x CD-ROM drive will connect to any PC Card enabled PC or Notebook and is ideal for mobile computing.

(97766)  
GST Inc **\$328**

### PCI Cards

Add super fast serial and parallel port interfaces to any PCI equipped PC.

(90688)

**Priced from**  
GST Inc **\$77**



ACARD TECHNOLOGY



## MirrorSmart RAID System

- ◆ Protect against drive failure
- ◆ Uses IDE drives
- ◆ Connects to any UltraWide SCSI Card
- ◆ Automatic rebuild

\*RENT: \$12.04/WK (B2913) GST Inc **\$1,099**

## Digital Memory & Readers

PRETEC

### CompactFlash



With CompactFlash Digital Film you can increase the storage capacity of any compatible digital camera or PDA.

16MB CompactFlash	(B2920)	GST Inc	<b>\$79</b>
32MB CompactFlash	(B2921)	GST Inc	<b>\$119</b>
64MB CompactFlash	(B2922)	GST Inc	<b>\$205</b>
128MB CompactFlash	(B2923)	GST Inc	<b>\$409</b>

PRETEC

### SmartMedia

SmartMedia cards expand the storage capacity of any compatible digital camera. Suitable for digital cameras from Olympus, Fuji and others.



8MB SmartMedia	(B2914)	GST Inc	<b>\$38</b>
16MB SmartMedia	(B2915)	GST Inc	<b>\$59</b>
32MB SmartMedia	(B2916)	GST Inc	<b>\$109</b>
64MB SmartMedia	(B2917)	GST Inc	<b>\$219</b>
128MB SmartMedia	(C3680)	GST Inc	<b>\$503</b>
SmartMedia Card Adapter	(B2918)	GST Inc	<b>\$109</b>

PRETEC

### Flash ATA



These credit-card sized cards use a metal case for maximum ruggedness. Solid state construction offers shock resistance.

8MB Flash ATA	(B9860)	GST Inc	<b>\$85</b>
16MB Flash ATA	(B9861)	GST Inc	<b>\$129</b>
32MB Flash ATA	(B9862)	GST Inc	<b>\$149</b>
64MB Flash ATA	(B9863)	GST Inc	<b>\$249</b>
160MB Flash ATA	(B9865)	GST Inc	<b>\$513</b>
256MB Flash ATA	(B9866)	GST Inc	<b>\$825</b>

\* Higher Capacities available

PRETEC

### MultiMediaCard



MultiMediaCard is the world's smallest removable flash storage card! Suitable for MP3 players, Mobile phones and Digital Video Cameras.

16MB MultiMediaCard	(B9871)	GST Inc	<b>\$77</b>
32MB MultiMediaCard	(B9873)	GST Inc	<b>\$139</b>
64MB MultiMediaCard	(B9878)	GST Inc	<b>\$295</b>

SMARTDISK

### FlashPath Floppy Adapters



Read your memory cards in your PC's floppy drive. Simply place the card into FlashPath and download your photos.

FlashPath SmartMedia Reader	(B2924)	GST Inc	<b>\$175</b>
FlashPath MultiMediaCard Reader	(B2925)	GST Inc	<b>\$175</b>

### USB Digital Memory Readers

Exchange data between your PC, laptop, MP3 player or Digital Camera.



SmartMedia and CompactFlash Card Drive	(B2926)	GST Inc	<b>\$95</b>
ATA Card Drive	(96056)	GST Inc	<b>\$99</b>
*SmartMedia, Memory Stick and CompactFlash Card Drive	(B9882)	GST Inc	<b>\$163</b>
*SmartMedia, Secure Digital/MMC and CompactFlash Card Drive	(B9884)	GST Inc	<b>\$163</b>

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## Copying and Connectivity

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### CopySmart CD Copier

Copy discs with a single button press.  
Standalone - no PC required.



**Lowest cost  
duplicator  
ever!!**

\*RENT: \$10.85/WK 8x4x32 (B2904) GST Inc **\$990**

**NEW** 16x10x40 (B9843) GST Inc **\$1,489**

\*RENT: \$16.32/WK

KOUWELL



**PCI Firewire  
Cards**

Connect your  
digital video  
camera to your PC.  
Download and edit  
your own movies.



PCI Firewire Card - 4 ports	(90689)	GST Inc	<b>\$109</b>
PCI Firewire Card - 6 ports	(A5161)	GST Inc	<b>\$223</b>
PCI Firewire Repeater Card - 5 port	(A5162)	GST Inc	<b>\$145</b>
PCI Firewire Repeater - 6 port	(A5163)	GST Inc	<b>\$154</b>
PCI Firewire Repeater - 10 port	(A5164)	GST Inc	<b>\$205</b>
6 pin to 6 pin Firewire cable	(B2905)	GST Inc	<b>\$22</b>

KOUWELL

**USB Hubs  
& Cards**



USB Hub - 6 ports	(79702)	GST Inc	<b>\$89</b>
PCI USB Card - 2 ports	(84801)	GST Inc	<b>\$44</b>
USB Network Cable	(B2908)	GST Inc	<b>\$75</b>
USB to Printer Cable	(84803)	GST Inc	<b>\$33</b>
Internal 3.5" USB Hub - 4 ports	(B2909)	GST Inc	<b>\$75</b>
USB to 10/100 Ethernet Adapter	(B2912)	GST Inc	<b>\$115</b>

KOUWELL **PCI SCSI Cards**



**NEW  
160MB  
Card**

The easy way to expand your  
PC. Connect multiple SCSI  
devices to one card.

PCI Bus, Ultra-SCSI	(90681)	GST Inc	<b>\$99</b>
PCI Bus, Ultra-Wide	(90683)	GST Inc	<b>\$175</b>
PCI Bus, 2 channel Ultra-Wide	(90684)	GST Inc	<b>\$375</b>
PCI Bus, Ultra2-Wide	(90685)	GST Inc	<b>\$279</b>
PCI Bus, Ultra 160	(B9847)	GST Inc	<b>\$527</b>

KOUWELL

**IDE Acceleration  
& Expansion Card**



Speed up your PC's  
new hard disk drives  
with this PCI plug in  
Ultra DMA 100 card.  
Supports transfer  
speeds of up to  
100MB/s with new  
ATA100 drives, and  
includes the ability to run up to 4 extra IDE  
or ATAPI drives on your system.



PCI IDE Ultra DMA 100 Card	(90688)	GST Inc	<b>\$77</b>
PCI IDE Ultra DMA 100 RAID Card	(B8410)	GST Inc	<b>\$145</b>

**FireWire  
for  
Notebook**



Adds two FireWire  
ports to your  
Notebook with a  
Cardbus Type II  
interface.  
Plug and Play!  
Supports up to 64  
devices  
simultaneously

FireWire to  
CardBus controller  
(2 port)

(B9849) GST Inc  
**\$120**

**USB 2.0**



Introducing  
USB 2.0. Faster  
than FireWire.  
Compatible with  
existing USB  
peripherals.

5 port Card (B9850)  
GST Inc **\$139**

4 port Hub (B9851)  
GST Inc **\$139**

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[www.ht.com.au/cat/verbatim](http://www.ht.com.au/cat/verbatim)

## CD / DVD Production Equipment

### PRIMERA TECHNOLOGY, INC. Signature IV CD Printer



- 1200x1200 dpi res
- Fast: 27 seconds per disc.

\*RENT: \$32.34/WK

(B9917) GST Inc

**\$3,298**

### PRIMERA TECHNOLOGY, INC. Signature Pro CD Printer



**NEW**

- 2400dpi
- Superfast
- Dual Ink Cartridges

\*RENT: \$40.08/WK (C3681)

GST Inc **\$4,289**

### PRIMERA TECHNOLOGY, INC. Inscripta Printer



- 610 x 305 dpi Thermal
- Durable finish

\*RENT: \$54.68/WK (B2932)

GST Inc **\$5,999**

PRIMERA TECHNOLOGY, INC.

### GP Composer CD / DVD Duplicator

#### GP Composer

- 2 x DVD-R (General Data)
- 1 x DVD-RW
- 8 x CD-R



**NEW**

Automatic DVD and CD Duplication. Choose from one of the optional add on Primera printers as shown on left. Includes DVD and CD mastering software.

\*RENT: \$74.44/WK (C5561) GST Inc **\$8,580**

PRIMERA TECHNOLOGY, INC.

#### Composer CD Duplicator



(Printer & stand not included)

Now 16x! 16x CD-R, 10 x CD-RW, 40 x Read CD Duplication system - 50 disc capacity. Printer optional extra.

Composer 16x CD-R Auto Duplicator

(C5708) GST Inc **\$Call**

PRIMERA TECHNOLOGY, INC.

#### Conductor Printer Autoloader



(Printer & stand not included)

Print up to 50 CD's on your Signature III/IV/Pro or Inscripta without having to manually load the discs!

Conductor Printer Autoloader

(B2934) GST Inc **\$3,398**

## Unattended Copiers

MICROBOARDS Technology, Inc.

### Orbit 2 CD Duplicator

Stand Alone CD Duplicator with 1 16x CD-R drive. 50 CD Capacity. An internal CD-ROM Drive holds the master disc being duplicated.

"The Orbit II, aptly billed as "The Office Copier," is built to fit: it's easier to use than a fax machine, it occupies about the same space, and it comes at an alluring list price." Emedia Magazine

Orbit 2 CD Duplicator



\*RENT: \$66.80/WK

(B9918) GST Inc **\$7,699**

MICROBOARDS Technology, Inc.

### Saturn 2 CD Publishing System

Stand Alone CD Dupliator with 2 12x4x32 CD-RW Drives and in-line colour printer. 150 CD Capacity. Internal 4GB+ hard drive to store your frequently used masters.



Saturn 2 CD Publishing System

\*RENT: \$147.79/WK (B9919) GST Inc **\$18,298**

## MultiDrive Towers

### Verbatim Viking Express

The Viking Express CD Duplicators provide powerful CD-R production capabilities in a modular system. 4, 6 and 8 master drive controller towers can be matched now or later with a satellite 4 or 8 drive upgrade tower allowing up to a total of 16 drives all recording

**NOW with 16x**



#### Viking Tower Duplicator

4 16x drives	(B9920) GST Inc	<b>\$6,439</b>
6 16x drives	(B9921) GST Inc	<b>\$7,988</b>
8 16x drives	(B9922) GST Inc	<b>\$9,534</b>
4 additional 16x drives	(B9923) GST Inc	<b>\$4,780</b>
8 additional 16x drives	(B9924) GST Inc	<b>\$7,754</b>

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## CD-R/CD-RW: Storage for life

### CD Recordable - 10 Pack



74 Min.  
650MB  
1x - 16x  
10 pack

(B4329) GST Inc:  
**\$15**

### Audio CD Recordable and Rewritable



74 min  
recordable  
(A2336) GST Inc:  
**\$3**  
74 min  
rewritable  
(B4327) GST Inc:  
**\$6**

### CD Recordable - Singles

74 Min. 650MB 1x - 16x Singles



(74740) GST Inc:  
**\$2**

### CD Recordable - Printable Surface

74 Min. 650 MB Printable Surface  
1x - 12x, 50 spindle pack



\*Printable surface  
also available in  
jewel-case

(93471) GST Inc:  
**\$72**

### CD Recordable - 80 Minute Colored CD's



80 Min.  
700MB  
1x - 12x  
colored CD-R's in  
matching superslim  
cases 25 pack

(B1355) GST Inc:  
**\$39**

### CD Recordable - 80 Minute



80 Min.  
700MB  
1x - 16x  
10 Pack

(B4710) GST Inc:  
**\$17**

### DataLife Floppy Diskettes



**11th Disk  
FREE!**

The world's No 1  
Floppy Disk  
25HD IBM format  
3.5" Floppy Disks

\*comes in pack  
(79452) GST Inc:

**\$6**

### CD ReWritable

650MB CD Rewritable 2x - 4x  
20 pack in slimline cases



2x - 4x 20 pack cases  
(xxxxx) GST Inc:

**\$Call**

2x - 4x Singles  
(77492) GST Inc:

**\$4**

4x - 10x Singles  
(B2658) GST Inc:

**\$5**

### Accessories

#### Deluxe Headset with Mic



- Volume control & on/off switch
- Microphone cover to eliminate distortion

(C2303) GST Inc:  
**\$18**

#### Comfort Headset with Mic



- Discreet modern shape for easy wearing

(C2304) GST Inc:  
**\$16**

#### Collapsible Headset with Mic



- Ideal for notebook users.

(77819) GST Inc:  
**\$15**



Did you  
know...

Verbatim CD's represent the latest in technology. Featuring a proprietary blue Metal-Azo dye which has the best resistance to sunlight, silver reflective layer for optimum read and write performance and multispeed recording.

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Sales: 1300 13 9999  
Fax: 1300 13 6666

Web: www.ht.com.au  
Email: sales@ht.com.au

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## Smart Storage Solutions

### Network Attached Storage **NEW**

#### NAS 160GB

lomega serves up performance! lomega® NAS 160GB servers, with Windows 2000 technology and multiple high-speed interfaces Ethernet and Ultra 160 SCSI. Includes free 20-seat license for QuikSync™ 3 automatic client backup software.



NAS 160GB



NAS 320GB

(C5567) GST Inc: **\$8,798**

#### NAS 320GB

lomega serves up performance! lomega® NAS 320GB servers, with Windows® 2000 technology and multiple high-speed interfaces for 10/100 and Gigabit Ethernet and Ultra 160 SCSI. Includes free 50-seat license for QuikSync™ 3 automatic client backup software.

(C5568) GST Inc: **\$12,579**

### Zip 100MB **NEW**

#### PPT Fast Start

With the simplicity and reliability of a Zip® 100MB Parallel drive and a Zip® 100MB disk included, there's no faster way to get started with lomega! And the parallel port, also called the printer port, is an external interface that is standard on all PCs, so you can attach your drive to virtually any PC in the world. The parallel port Zip drive detaches easily and goes where you go.

(C5570) GST Inc: **\$275**



### Peerless

The next generation in high-capacity removable storage. lomega's Peerless™ drive system offers 10GB and 20GB disks, interchangeable interfaces, and 15MB/sec transfer rates for stunning performance. Firewire® and USB 1.1 interfaces available.

(C5525) GST Inc: **\$798**



Zip 100MB disk: (23772)  
GST Inc: **\$25**

10-pack:  
(21889) GST Inc: **\$205**

Zip PCMCIA SCSI accelerator card (35145)  
GST Inc: **\$179**

Zip ISA SCSI Zoom accelerator card (21888)  
GST Inc: **\$78**

Zip drive carry case (31823)  
GST Inc: **\$49**

Zip parallel cable (46305)  
GST Inc: **\$39**

Zip SCSI cable (46304)  
GST Inc: **\$35**

Zip disk labels 20-pack (48059)  
GST Inc: **\$5**

Jaz 2GB External Drive (78941) GST Inc: **\$749**

Jaz 2GB disk (61652) GST Inc: **\$209**

Jaz 2GB 3-pack (57271)  
GST Inc: **\$595**

Jaz 1GB disk (24218) GST Inc: **\$199**

Jaz 1GB 3-pack (32844)  
GST Inc: **\$589**

### Predator lomega Predator CD-RW drive

lomega® Predator™ Firewire (8x4x32) drive. Announcing the latest addition to the hottest looking external CDRW in the lomega range - the new Predator with Firewire connection. PC and Mac compatible, the new Predator Firewire allows true drive speed of 8x4x32, and provides versatility with interchangeable USB & PCMCIA adapters.

Predator™ USB lomega CD-RW External

(B4416) GST Inc: **\$549**

lomega CD-RW™ USB External 4x4x6

(92623) GST Inc: **\$459**

Predator™ Firewire 8x4x32

(C2413) GST Inc: **\$742**



### lomega CD-RW

#### Internal Drive

lomega ZipCDRW Internal drive is the ideal way to store, share and archive information in a common 650MB format. Compatible with Windows 2000. Also ships with Adaptec Easy CD Creator v4.02c and Direct CD 3.01.



16x10x40  
(C2414) GST Inc: **\$549**

12x10x32  
(B0882) GST Inc: **\$448**

### Host Powered 250 USB

NEW - Host-powered Zip® 250MB USB drive. Now it's even easier to take your information with you. The Zip® 250 USB drive is now available with a USB cable that provides both data and power, so you don't need any external power source. Its easy to connect (just plug it in) and easy to launch (no rebooting). Also comes with the new U-shaped Zip® 250MB disk. This new drive is compatible with most major operating systems and all Zip 100MB and 250MB Zip disks.



Host powered 250 USB Ext  
(B6404) GST Inc: **\$395**

250MB USB Ext (with AC adapter)  
(82633) GST Inc: **\$410**

Not all items are in stock at all stores but can be ordered!

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# Surround Yourself With The Very Best

## Cordless MouseMan® Optical

This comfortable mouse for either hand combines advanced cordless and optical technologies. Digital Security IDs lock out interference and make the receiver only listen to one mouse. Logitech's smart power management allows the mouse to work for months on the included AA batteries. The low battery indicator gives plenty of warning before needing to change batteries. PC/Mac. 5-year warranty.



(C1186) GST Inc: **\$147**

## QuickCam® Pro 3000

With its CCD sensor, QuickCam Pro 3000 takes pictures and videos with true 640x480 resolution. Use its built-in microphone to make live video calls over the Internet and send pictures and videos with your emails. QuickCam software lets you easily setup a digital surveillance camera and broadcast live video and audio over the web. Add professional titles, fades and wipes to your videos with the included MGI software. Connection via USB.

(B0805) GST Inc: **\$219**

## QuickCam® Web

Logitech QuickCam Web has everything you need to capture video, send video e-mail, make live video calls, post web albums, broadcast over the Internet and more. With its integrated microphone and excellent assortment of easy-to-use software, QuickCam Web is the perfect Internet video camera for everyone. Connection via USB.

(A2833) GST Inc: **\$158**

## SoundMan® SR-20

Delivers high-definition sound, solid bass for your favourite CD/MP3 songs. Compact, attractive styling. Remote control with headphone jack. Includes digital music CD. 2-year warranty.

(A5011) GST Inc: **\$89**

## Marble® Mouse

Logitech Marble Mouse fits right and left hands like a mouse yet works like a trackball. Save space while reducing hand and wrist movement. Patented Marble optical technology provides superior precision and smooth motion without regular cleaning. Marble Mouse works with PC's and USB-port Macintosh systems. Three-year warranty.

(B7946) GST Inc: **\$85**

## QuickCam® Traveler

QuickCam Traveler combines easy web communication with the freedom of a digital still camera. It's loaded with features - like a self-timer, macro setting and storage for up to 200 shots. You can adjust resolution or delete duds, then instantly zap the shots into your computer. QuickCam Traveler is also a video camera that plugs into your PC for all kinds of Internet video: video-conference, video-mail, video-greetings, live broadcasting, animation, even remote video surveillance! With the included video editing software, you can create titles and transitions, add music, narration, sound effects and more!



(A8024) GST Inc: **\$275**

## Cordless Freedom™ Pro



Ideal cordless keyboard and mouse combination for exceptional comfort, cordless freedom and aesthetic design. The split layout with a gentle curvature makes it easy to use. iTouch™ keys for easy access to the Internet and multimedia. 5-Year warranty.

(B1478) GST Inc: **\$215**

**NEW!**

**Optical Mouse**  
(B9948)  
GST Inc: **\$49**



**TrackMan Live!**  
(77753)  
GST Inc: **\$267**



**Cordless Mouse**  
(C2310)  
GST Inc: **\$89**



**Cordless TrackMan Wheel**  
(A2157)  
GST Inc: **\$110**



**Cordless TrackMan FX**  
(B0831)  
GST Inc: **\$148**



**Deluxe Access 104 Keyboard**  
(B0819)  
GST Inc: **\$38**



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## BUSlink Hard Drive. Technology the easy way.

### BUSLINK 3.5' EXTERNAL USB HARD DRIVE



USB 20GB (C3818)  
GST Inc: **\$495**

USB 40GB (C5602)  
GST Inc: **\$770**

USB 60GB (C5603)  
GST Inc: **\$880**

USB 80GB (C3819)  
GST Inc: **\$995**

BUSlink USB Hard drive is a fast, easy way to add additional storage to your computers. Reliability and design: BUSlink USB Hard Drives feature tough alloy enclosures, and are designed to be stackable. And they're built to last, with an MTBF (Mean Time Between Failures) of 300,000 hours.

- Data transfer rate up to 8Mb/sec.
- Easy system backup and disaster recovery
- Connects via USB port
- One year limited warranty
- Compatible with Windows 98, 98SE, ME & 2000

### BUSLINK'S CD-REWRITABLE DRIVE

(C3821)  
GST Inc: **\$495**



BUSlink's CD-Rewritable Drive allows you to write and rewrite data files. To record your favorite music CD, to copy other CDs, and to backup your important files with unsurpassed reliability, do it all, with BUSlink's CD-Rewritable Drive.

- Adaptec's Easy CD Creator & Direct CD software included
- Writes CD-R & CD-RW at 4x
- Reads at up to 6x max.
- Data transfer rate up to 8Mb/sec.
- Converts MP3 files into audio CD's
- Easy system backup and disaster recovery
- Connects via USB port
- One year limited warranty
- Compatible with Windows 98, 98SE, ME & 2000



# matrox

## Powerful 2D/3D Video Graphics Card



**Millennium  
G450**  
(B6886) GST Inc: **\$395**

The undisputed industry leader in 2D and 3D Image quality.  
**Matrox Millennium G450 Dual Head Graphics Acceleration Card**  
The Matrox pioneered DualHead display, introduced and made popular by the award winning Matrox G400 series, making the millennium G450 the most versatile and feature-rich graphics card on the market today. DualHead offers a host of display features and software utilities that will change the way you work and play on your PC.

**DualHead Display** offers a host of options designed to meet your particular needs.

- DualHead Multi-display
- DualHead Zoom
- DualHead DVDMax
- DualHead TV Output
- DualHead Clone

**Incredibly Sharp and realistic image quality**

- UltraSharp, Lightning-fast 360MHz RAMDAC
- Vibrant Color Quality (VCQ2)
- Environment Mapped Bump Mapping which adds a new level of visual realism to many game environments
- More advanced 3D features e.g. Stencil buffering, trilinear filtering, alpha blending etc.

**Powerful 2D and 3D acceleration**

- Matrox G450 256-bit DualBus
- 3D Rendering array Processor
- Advanced AGP support
- Over 35 games that support Environment-Mapped Bump Mapping (EMBM), or DualHead including: Star Trek, Armada, Baseball 2000, Destroyer Command, Battlezone II, Combat Commander, The Rift etc.

**G45+MDHA16DB**  
OEM (B3110) GST Inc:

**\$275**

**G45+MDHA16LXB**  
OEM (C0015) GST Inc:

**\$210**

Millennium Dual Head G450 16Mb DDR no cable or software OEM



**G45+MDHA32DB**  
OEM (B3111) GST Inc:

**\$387**

**G45+MVTA32DRI**  
OEM (C0016) GST Inc:

**\$678**

Marvel G450e TV (PAL) 32Mb DDR inc Matrox PC-VCR and Matrox DVD Inc Ulead Videostudio 4.0 and Ulead Photo Explorer 6.0



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# Professional Video Tools



## canopus

## New Products!

### DVRaptorRT

Real Time for Real Editors

A high-performance single slot solution with impressive capabilities such as Multiple Real Time Video Tracks, Filters, Transitions & Titles; Real Time Analogue Output; Mpeg 1&2, DVD, SVCD, VCD and Web Streaming!!! Scalable Technology - More CPU Power = More Real-Time Capabilities

**DVRAPTOR-RT**

(C5577) GST INC **\$1,199**



### DVBooster Pack

(Adobe Premiere 6 Plug-In)

This pack enhances your ability to create visually stunning videos with Canopus' high-quality 3D transitions and optimized filters. Combining features which offer editing flexibility and functionality, speedier video productions, output to MPEG 1/2 and streaming video files, the Booster Pack becomes an essential tool and a must have for today's DV editor. Compatible with all Canopus or other editing systems that support Adobe Prem 5.1/6 or Ulead MSP 6.



**DVBOOSTER PACK** (C5579) GST INC **\$479**

### JD-1 Jog Shuttle Controller

A professional jog/shuttle controller compatible with all Canopus or other editing systems that support Adobe Prem 5.1/6 or Ulead MSP 6. JD1 gives you quicker, more intuitive editing and ease of use by combining keyboard sequences and mouse functions into one unit. Connecting via USB it is very simple to install and so compact it will integrate into even the smallest work environment.



**JD-1 SHUTTLE & JOG**

(C5578) GST INC **\$399**

### Xplode Professional

(Adobe Premiere 6 Plug-In)

Arming video editors with the power to create stunning, professional-quality video content, Xplode Professional is a highly developed 3D video effects package featuring Canopus' powerful Xplode technology. Offering hundreds of customizable effects and transitions, acceleration via the support of third-party graphics boards and SmartConfig an intuitive interface that makes creating custom effects a snap. Compatible with all capture cards.



**XPLDPROFESSIONAL** (C5580) GST INC **\$779**

### EZDV

Bullet-proof, high speed Canopus DV codec. Precise, fast MPEG 1&2 encoding straight from the editing timeline.



with EZ Edit:

(97877) GST INC: **\$499**

with Premiere V6.0:

(C0023) GST INC: **\$799**

### DV RAPTOR

with Raptor Edit:

(A8997) GST INC: **\$999**

with Premiere V6.0:

(C0024) GST INC: **\$1,289**



### DV STORM

Render-free, real-time digital video editing, DV and Analogue input/output, MPEG output for DVD, Web streaming capabilities - the ultimate digital video editing experience!



with Storm Edit

(B4401) GST INC: **\$2,949**

with Premiere V6.0

(C0025) GST INC: **\$3,299**

## Hauppauge!



### Hauppauge Personal Video Recorder

Watch and record your TV shows with instant replay and program pause. Burn your favourite TV shows onto CD-ROM.

**PCI** (B2593) GST INC **\$669**



### Hauppauge TV

Watching Television on your computer has never been easier with Hauppauge TV.



HAUPPAUGE TV	(89063)	GST INC	<b>\$149</b>
HAUPPAUGE TV GO - FM	(89064)	GST INC	<b>\$195</b>
HAUPPAUGE TV USB	(89066)	GST INC	<b>\$255</b>
HAUPPAUGE TV USB - FM	(98455)	GST INC	<b>\$299</b>
DV WIZARD	(A8925)	GST INC	<b>\$249</b>

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## Video Editing Hardware

### DV500 PLUS

#### Includes full version of Adobe Premiere 6.0

Successor to the award winning DV500 solution DV editing with Analogue output (S-VHS, VHS), DV input and output. Supports all Windows 2000/NT/Me/98SE/98 operating systems. The ONLY real-time editing solution which takes full advantage of all Adobe Premiere 6.0 capabilities with professional quality features such as: Audio effects, Create CDs or files for the Internet or email, Outputs MPEG-1 & 2, Real Networks and AVI, Real-time multi-track audio mixer for volume adjustments, Real-time 16:9 widescreen effects, transitions and titles, TitleDeko RT with video output for title creation previews, Real-time image correction for color and brightness controls



**HOT  
NEW PRODUCT**

(B9962) GST INC  
**\$1,759**

### DV200

#### Digital Video Editing.

Fully featured FireWire (IEEE 1394) digital video editing solutions. Features instant video technology, an additional 400 transitions, DV-2 speed Codec for ultra fast rendering, capturing up to 12 T bytes and outputs to digital widescreen (16:9). Includes Adobe Premiere 6, Hollywood FX Alpha Magic, Hollywood Copper and Title Deko.



(77104) GST INC  
**\$757**

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### Pinnacle Studio Action

Specially created for kids in conjunction with LEGO, suitable for ages 8 and over. Create and edit movies, capture video from any camcorder or VCR. Show your movies on your PC, email it, or put it on the web. Includes USB/video capture device and easy to use Studio Action video editing software.



**HOT  
NEW PRODUCT**

(B8631) GST INC

**\$190**



### Pinnacle Studio Online

#### Create movies to be viewed over the Internet.

Includes Studio video editing software. Comes with USB video capture device. Includes Free membership in Pinnacle Systems' video sharing website, with free online storage for your movie files and a complete, personal email package to let everyone know where to view them.



**HOT  
NEW PRODUCT**

(B8632) GST  
INC **\$189**

### Pinnacle Studio DV Plus

DV editing with Analogue output (S-VHS, VHS), DV input and output. Capture footage in low resolution with the SmartCapture, which then creates the movie in full resolution with minimum disk space usage. Audio effects. Create CDs or files for the Internet or email. Outputs MPEG-1 & 2, Real Networks and AVI.



**HOT  
NEW PRODUCT**

(A8908) GST INC **\$480**

### Pinnacle Studio PC TV

Bringing high quality editing to the home market. Easy-to-use providing full screen and full motion video capture. Up to 25 frames per second, and a transfer rate up to 6 MB per second. With composite & S-VHS video input & output.



Without the 2 GIG file  
size limitation.  
Includes Title Deko,  
Video Spike rack lite,  
Smartsound software.

**HOT  
NEW PRODUCT**  
(80290) GST INC  
**\$225**



# Kodak

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## Share Moments. Share Life™

### Kodak DX3500

Looking to go digital? Look to the easy-to-use KODAK DX3500 Digital Camera. Get crisp, vibrant prints up to 8" x 10" thanks to its 2.2MP resolution and 3X digital zoom. Start shooting right away with 8MB of internal memory. Want to take more pictures? The DX3500 comes equipped with a COMPACTFLASH Card expansion slot so you can boost your camera's memory capacity. One touch. That's all it takes to get pictures from your KODAK DX3500 Digital Camera to your computer. Place your DX3500 camera in its Dock, press the button, and you're ready to print and e-mail with ease. You'll never miss a picture-taking opportunity since your camera batteries are recharged every time you rest the camera in the Dock.

- KODAK Picture Software lets you instantly view, edit, e-mail, and print your pictures.
- Get great-looking prints with 2.2MP resolution and 3X digital zoom.
- Handles like a point-and-shoot.
- Get shooting right away with 8MB of internal memory.

KODAK DX3500  
(C2151) GST Inc: **\$689**



NEW!

#### KODAK ACCESSORIES

Premium  
Camera Bag  
(82273) GST Inc:

**\$49**

80 Minute  
(B3071) GST Inc:

**\$3**

Gold/Silver  
10 Pack  
(A7932) GST Inc:

**\$7**

#### KODAK PICTURE CARDS

32MB Picture  
Card  
(62677) GST Inc:

**\$142**

64MB Picture  
Card  
(82249) GST Inc:

**\$236**

96MB Picture  
Card  
(88332) GST Inc:

**\$349**

### Kodak MC3 portable media device

All the multimedia you've ever wanted in one little player. Click into digital video mode to shoot funny movies or snap a few digital pictures. Download your favorite MP3s and take them with you, listening via ear buds or through your boom box or car stereo. It's one of the only MP3 players with a reflective color preview screen, so you can use it even in bright sunlight. Transferring to your PC is a breeze. It even lets you combine your pictures, music and video into unique music videos.



(B9818) GST Inc:

**\$389**

### Kodak DC5000

Rugged, durable, and easy-to-use, the KODAK DC5000 will help you get the job done. The DC5000's weatherproof body will hold up under the toughest circumstances. Two-megapixel resolution provides you with excellent picture quality even on 8" x 10" prints. The 2X optical (30 - 60 mm) and 3X digital zoom let you choose wide angle or telephoto to take pictures in a variety of open spaces. All in all, a practical, intuitive package that is as easy to use as a point & shoot, but tough on the job.



(A3540) GST Inc: **\$1,009**

### Kodak DC3400

• Two-megapixel resolution means exceptional detail and brilliance - up to 8" x 10" prints. • Its 2X optical zoom delivers crisper close-ups, and its 3X digital zoom lets you get even closer. • User-friendly controls make the DC3400 quick to learn & easy to use. • Zoom Digital Camera, ensuring high quality & no-nonsense performance. • Get connected quickly & easily with its USB and serial cables - it's easy to download, organize, and e-mail your pictures. • Print your pictures with convenience from your own printer.



(A5579) GST Inc:

**\$794**

### Kodak DC3800

The KODAK DC3800 Digital Camera is the sleek, high-performance, easy-to-use digital camera. Its small size makes it pocket-perfect. The 2.1MP resolution delivers detailed, vibrant pictures on screen and paper. And the 2X digital zoom lets you focus on what's important. The USB COMPACTFLASH Card Reader makes it easy to upload your pictures and its point-and-shoot design makes it user-friendly.



(C5552) GST Inc:

**\$679**

### Kodak PM200 printer

The most distinctive feature on the Personal Picture Maker 200 is its 1.8-inch, full-colour, LCD preview screen just like those on digital cameras. You don't even need to be connected to a PC, you just insert a memory card from a digital camera (the PPM200 accepts both Smart Media and Compact Flash formats) to print. The preview screen allows you to scroll through all the images on the card, select those to print, choose the number of copies, and in what size and layout. Compatible with Microsoft Windows 98 and Millennium Edition, it connects easily via a USB port.



(B3084) GST Inc:

**\$549**

### Kodak DC3200

Capture fun and spontaneity with the DC3200. One megapixel resolution means eye-catching e-mails and prints up to 5" x 7". Its 2X digital zoom delivers great detail. Two megabyte internal memory and COMPACTFLASH Card capability keeps you shooting longer. And its LCD screen lets you preview your pictures with ease.



(B1255) GST Inc:

**\$374**

EXTRA  
16MB PIC  
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## New Tools for the "E" Generation



Arcus 1200  
SCSI-2. 42 bit.  
Transparency  
scanning.  
Opt. res.  
1200x2400ppi  
(B9613)  
GST Inc:

**\$1,359**



DuoScan  
T2500  
SCSI-2. 36 bit.  
Transparency  
scanning. True  
opt. res. 2500  
x 1250ppi  
(74499)  
GST Inc:

**\$7,946**



DuoScan HiD  
(92981)  
GST Inc:

**\$3,650**

Document  
Feeder  
DuoScan  
T1200  
(75581)  
GST Inc:

**\$405**

Batch Slide  
holder set for  
DuoScan  
T1200.  
(75582)  
GST Inc:

**\$199**



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### SnapScan e25

600x1200ppi (9600ppi maximum), 42bit flatbed scanner with USB interface. Features one-touch buttons for scanning direct to e-mail, printer or ScanWise. Includes 3 interchangeable coloured handles. Software package includes Agfa ScanWise, Readiris, Corel PrintOffice 2000 and AGFAnet Print Service. Compatible with Win98/2000/Me and MacOS.



(B6378) GST Inc: **\$250**

### SnapScan e20

600x1200 optical resolution (9600 maximum), 36bit, USB interface, Mac & Win98/Win2000Me compatible. Includes 3 interchangeable coloured handles. Software package includes Agfa ScanWise, Readiris and Corel PrintOffice 2000



(B1175) GST Inc: **\$190**

### SnapScan e40

1200x2400ppi (9600ppi maximum), 42bit flatbed scanner with USB interface. Software package includes Agfa ScanWise, Readiris and Corel PrintOffice 2000. Compatible with Win98/2000/Me - MacOS



(A5009) GST Inc: **\$310**

### SnapScan e52

1200 x 2400ppi (9600 maximum), 48bit flatbed scanner with built in transparency module for transparency and negative scanning. Features one-touch buttons for scanning direct to email, OCR, printer or image manipulation software. USB interface. Software package includes Agfa ScanWise, IRIS Readiris, Adobe PhotoShop LE (Win. Only), Adobe PhotoDeluxe (Mac Only), Ulead Photo Explorer, NTM Web Personal.



(C3805) GST Inc: **\$442**



### ePhoto CL18

Dual mode (still image and live action), compact, easy to use digital camera with USB interface and a resolution of 640x480 pixels. Stores 16-32 images on 2MB internal (non-removable) memory card. Extensive software package includes: Agfa Twain Driver, ArcSoft Video Impression, Corel PrintOffice and PrintHouse (with Agfa PhotoGenie QuickFix technology), MicroSoft Net Meeting, AGFAnet Print Service.

(99757) GST Inc: **\$249**



### ePhoto CL20

Dual mode (still image and live action) megapixel digital camera with USB interface. Resolution of 1280x960 pixels (with PhotoGenie). Stores 10-30 images on 1MB internal memory with a CompactFlash slot for optional storage on CompactFlash cards (card not included). Extensive software package includes: Agfa Twain Driver, AgfaCam Mounter, Agfa PhotoWise 3.0, ArcSoft Video Impression, MicroSoft Net Meeting, AGFAnet client software, Acrobat Reader.

(B1153) GST Inc: **\$335**



### ePhoto CL34

Dual mode (still image, video conferencing, video clipping) megapixel digital camera with USB interface. Resolution of 1.3 megapixel - photo quality for perfect prints. Features 2 x digital zoom, auto/manual focus, 4.5cm colour LDC. Stores 4-36 images on internal memory with a Compact Flash slot for optional storage on Compact Flash cards (card not included).

(B2321) GST Inc: **\$486**



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## Laser Printers to suit your budget and requirements

### Laser Printer

#### ML4500

##### Personal Printer

- Excellent printing -8 ppm Printing Speed
- Real 600 dpi resolution
- 35MHz High Performance RISC Processor
- Economic Printing -Toner Save Button: 30% Toner saving a year, print -N-up Printing (Multi-page printing on one sheet)
- Cancel/Reprint Button
- 150 Sheet Multi-purpose input Tray
- Extra sheet feeder for envelopes, labels, card stock, or transparencies



ML4500 (C1795) GST Inc **\$496**

##### Toner Drum Cartridge

(2,500 pages at 5%) (C1799) GST Inc **\$128**

### Laser Printer

#### ML5200A

##### Personal Printer

- Fast 10ppm printing speed
- 1200dpi class outstanding resolution with SRT
- HP PCL 6 compatible emulation
- Various 45 scalable fonts including 10 true type fonts
- One piece integrated toner & OPC imager of 6000 pages at 5% coverage
- Easy to use, easy installation - easy connection
- Stable paper handling & versatile media and paper size



ML5200A (C1796) GST Inc **\$684**

##### Toner Drum Cartridge

(6,000 pages at 5%) (C1800) GST Inc **\$181**

### Laser Printer

#### ML6060

##### 12PPM Printing Speed

- Instant on Fuser prints First Page in 15 Seconds
- 4MB DRAM (up to 68MB):ML-6060
- 1200 DPI with SRT Rand SGT R
- Toner Save Button & Reprint button
- 550 Sheet cassette bank (optional 550 sheet)
- Sufficient Memory of Standard 4MB with SMET Rand Greater Maximum Memory Capacity of 68MB.



ML6060 (C1797) GST Inc **\$885**

##### Toner Drum Cartridge

(6,000 pages at 5%) (C1801) GST Inc **\$181**

• SRT R(SAMSUNG Resolution Technology) • SGT R(SAMSUNG Gray Technology)

### Laser Printer

#### ML7050

##### Superior Printing Performance

- 17PPM Printing Speed on Letter-size Sheets
- New High Performance Controller based on Motorola PowerPC 603e 100Mhz Processor
- Instant on Fuser prints First Page in 13 Seconds
- Duplex Mechanism Built-in, need no Extra Charge
- Flexible Paper Handling
- 600 sheets Standard with Two Input Sources
- 500 sheets Universal Cassette Handles Various Sheet Size from letter to Executive



ML7050 (C1798) GST Inc **\$1,592**

##### Toner Drum Cartridge

(8,000 pages at 5%) (C1802) GST Inc **\$249**

#### PRINTER OPTIONS

##### ML6060

550 PAGE  
CASSETTE  
(C1803)  
GST Inc  
**\$255**

PS III  
CARD FOR  
(C1804)  
GST Inc  
**\$254**

##### ML6060 & ML7050

NETWORK  
10/100  
(C1805)  
GST Inc  
**\$441**

##### ML7050

500 PAGE  
CASSETTE  
(C1806)  
GST Inc  
**\$272**

ML+7050N6  
RS232/  
LOCALTALK  
(C1807)  
GST Inc  
**\$162**

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On the back of a year that saw sales double, Hitachi CRT monitor sales have increased another 300%\*. Why the massive growth? Is it the comprehensive range? Is it the leading technology or superior quality?

Is it the extensive testing which breeds reliability? Maybe it's the value for money - it must be the price. Curious? See for yourself why they really are the prize catch, visit [www.ht.com.au/cat/hitachi](http://www.ht.com.au/cat/hitachi)



**CMP307XU**  
4:3 37" Plasma  
Display  
1024 x 768, 0.735MM  
Pixel Pitch  
(A9663) GST INC  
**\$22,052**



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**CM715**  
19" CRT  
1600 x 1200 @ 75Hz  
(97803) GST INC  
**\$768**



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**CMP205SX**  
25" Plasma Display  
(88323) GST INC  
**\$10,409**



**CM772**  
19" Flat CRT  
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@ 85Hz  
(B3064) GST INC  
**\$1,100**



**CM625**  
17" Flat CRT  
1600 x 1200 @ 75Hz  
(B1361) GST INC  
**\$611**



The ideal monitor for basic graphics work in the home or office. Hitachi's InvarShadow Mask provides a fine horizontal mask pitch of only 0.23mm.

**CM615 17" CRT 1024 x 768 @ 85Hz**  
(97802) GST INC **\$465**



**CM813 Plus**  
21" CRT  
1920 x 1440 @ 75Hz  
(70915) GST INC  
**\$1,940**

### CP-S220 LCD Projector

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- \* SVGA 800 ANSI Lumen
- \* Short Throw Distance - ensures large images even in limited spaces
- \* Ultra-Slim Unit (only 60mm high)
- \* Light Weight (only 2.4kg)
- \* Low-noise operation (34dB)

(A9731) GST Inc: **\$5,659**

\*Free Carry Bag comes bundled with Projector



**CML170SXW 17" TFT with speakers**  
1280 x 1024 @ 75Hz  
(B3051) GST INC

**\$3,098**



**CML152XW 15" TFT with speakers**  
1024 x 768 @ 75Hz  
(C5622) GST INC

**\$1,376**

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## The Power to Create

### next generation printers

#### EPSON STYLUS C20UX

BONUS USB CABLE (in box)  
\*While stocks last



The Easy-To-Use Home Colour Printer that gives photo quality printing, and delivers best-in-class for overall cost effectiveness.

##### KEY FEATURES

- Up to 720 x 720 dpi photo quality printing
- Fast, easy set-up and operation
- USB equipped for simple plug and play printing.
- Up to 6.5 ppm black text printing

(C5572) GST INC **\$139**

#### EPSON STYLUS C40UX/C40SX



The Easy to use Quality Home Colour Printer with up to 1440 dpi.

##### KEY FEATURES

- Up to 1440 x 720 dpi photo Quality printing.
- Fast, easy set-up and operation of both models.
- Choice of USB or Parallel models, simple plug and play printing.
- 8ppm black text speed and 3.9 ppm colour text speed

EPSON STYLUS C40SX (Parallel) (C5574) GST INC

**\$182**

EPSON STYLUS C40UX (USB) (C5573) GST INC

**\$182**

#### EPSON AL-C2000



EPSON technologies, including AcuLaser Multiple-screen Printing, Colour RIT and Colour Stabilizing. In addition, AcuLaser Colour Halftoning provides print resolution equivalent to 2,400 dpi (defined print resolution: 600dpi). Text is extremely sharp and photos have excellent contrast.

(A7365) GST INC **\$4,430**

#### EPSON STYLUS COLOR 890



Economy mode: 9.6 ppm black text, 9.2 ppm colour text • 2880 x 720dpi I/FACE: Parallel and USB • 6 colours • Roll paper printing • 4pl Ultra Micro Droplets (Better tone gradations and reducing graininess) • Edge-to-edge printing (borderless printing like traditional photos)

(B3391) GST INC **\$616**

#### EPSON STYLUS COLOR 680



With industry leading 2880 dpi print resolution and super fine 4pl Micro Droplets, images produced from this printer are indistinguishable from photographs. EPSON's exclusive Micro Piezo technology ensures high-speed throughput with crisp, sharp text.

(A8093) GST INC **\$269**

#### EPSON STYLUS COLOR 980



One of the best business printers ever. • Up to 13.0ppm lightning fast black text printing • Up to 2880dpi photo quality printing resolution • 3 picolitre ultra micor dots for super fine printing • Network capable flexibility through type B Ethernet.

(B0594) GST INC **\$715**

#### EPSON STYLUS COLOR 880



Here is an inkjet printer that offers everything today's business users demand – speed, super-sharp text, beautiful graphics & super smooth operation, thanks to EPSON's Micro Piezo technology. High print speed & industry leading print quality.

(B0581) GST INC **\$439**

#### EPSON STYLUS COLOR 1160



• Printing method - On-demand inkjet (piezoelectric) • Nozzle configuration - 144 nozzles (Black), 48 x 3 nozzles (Cyan, Magenta, Yellow) • Print direction - Bi-directional with logic seeking • Resolution - 1440 x 720 dpi.

(87723) GST INC **\$718**

### colour scanners

#### EPSON EXPRESSION 1640XL

The Expression 1640XL A3+ scanner features EPSON's most advanced scanning technologies providing high speed, maximum detail and superior sharpness and clarity.



(B1330) GST INC **\$5,455**

#### EPSON EXPRESSION 1640SU

• 1600dpi ultra high-resolution imaging • 42-bit input and output • multi-function Epson smart panel • Advanced Epson twain 5 driver.



(B0556) GST INC **\$585**

#### EPSON PERFECTION 640U

The ideal home scanner providing 600x2400 dpi image quality at the touch of a button. The EPSON SMART PANEL user friendly interface allows you to take advantage of its advanced scanning features with ease.



(B0537) GST INC **\$257**

#### EPSON PERFECTION 1240U

This scanner provides 1200 x 2400dpi image quality with incredible operating ease. The EPSON SMART PANEL allows you to add high quality images to e-mail, documents & presentations, produce colour copies & photo reprints, convert scanned text to editable text & image editing tasks.



(B0546) GST INC **\$422**

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☐ Extend to a total of 5 Years Return to Base

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**HARRIS TECHNOLOGY.** @ **Kmart**



## Can on a Canon, Can Do!

### SENSATIONAL NEW PRODUCT - \$600



**PowerShot  
A10**  
DIGITAL CAMERA  
(C3968)  
GST INC  
**\$734**



**PowerShot  
A20**  
DIGITAL CAMERA  
(C3864)  
GST INC  
**\$874**



**PowerShot  
DIGITAL  
IXUS-V**  
(C5389)  
GST INC  
**\$1,174**



**PowerShot  
DIGITAL  
IXUS 300**  
(C5653)  
GST INC  
**\$1,399**  
RRP

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- Four individual ink tanks with low-ink sensor
- Up to 15 ppm black / 10ppm color
- 2400 x 1200 dpi in color (38% greater than 2880 x 720 dpi)
- 8" x 10" photo in approx. 90 seconds
- Advanced MicroFine Droplet Technology™ for exceptional photo-image quality
- Compatibility: Windows® 95/98/2000, Windows NT® 4.0, Windows Me and Mac® OS 8.1 or later

2400x1200dpi  
(C4013) GST INC  
**\$549**



### PRINTERS



360x720dpi  
(A1792) GST INC  
**\$99**

#### BJC-1000SP Bubble Jet Printer

- Outstanding operating economy.
- Vivid colours, even on plain paper.
- Exceptional photographic quality.
- Automatic image improvement.
- Banner printing and outstanding versatility.



360x720dpi  
(A3173) GST INC  
**\$137**

#### BJC-2100SP Bubble Jet Printer

- New Super Economy mode cuts operating costs by up to 75%.
- High speed printing, up to 5 ppm black text and up to 2 ppm colour.
- Optional colour scanner.
- Now with parallel port.



1440 X 720dpi  
(B9834) GST INC  
**\$214**

#### S400 Bubble Jet Printer

- Super-high resolution, up to 1440 x 720 dpi.
- Brilliant colour inks.
- Operating economy.
- Extraordinary photo printing.
- Optional colour scanner cartridge IS-32.



1440x720dpi  
(C5595) GST INC  
**\$Call**

#### NEW!!! S4500 Bubble Jet Printer

- Print speeds up to 10 ppm in black text & up to 7 ppm in colour text & graphics
- New brilliant inks.
- Separate ink tanks for each colour.
- Parallel connectivity for Windows 95/98/2000.
- Optional IS-32 scanner cartridge.



1200x2400dpi.  
(B9836) GST INC  
**\$559**

#### S800 Bubble Jet Printer

- Photo Lab printing for the desktop.
- Printing resolutions up to 2400 x 1200 dpi.
- Separate ink tanks for each colour.
- Includes Photo Optimiser Pro and Photo Record image browser software.



600x600dpi.  
(C3917) GST INC  
**\$509**

#### LBP810 Printer

- High resolution 600 dpi printing for crisp text and graphics.
- 8 ppm engine speed.
- Wide media compatibility, print transparencies, envelopes, postcards etc.
- Outstanding line definition - equivalent to 2400 dpi horizontally.
- Parallel & USB connections for wide compatibility.

### SCANNERS



300x600dpi  
(A8919) GST INC  
**\$99**

#### N340P Flatbed Scanner

- Optical resolution is 300 by 600 dpi with selectable resolution up to 2400 dpi.
- 14 Bit colour input.
- ScanGear Toolbox for easy copy, fax and e-mail operations.
- Simple parallel connection for wide compatibility.



600x1200dpi  
(A7655) GST INC  
**\$128**

#### N640P Flatbed Scanner

- Optical resolution is 600 by 1200 dpi with selectable resolution up to 9600 dpi.
- Revolutionary 39 mm thick design.
- ScanGear Toolbox for easy copy, fax and e-mail operations.
- LIDE Technology for distortion free scanning.



600x1200dpi.  
(A3522) GST INC  
**\$159**

#### N650U Flatbed Scanner

- 600 x 1200dpi optical with selectable resolution up to 9600dpi.
- 42 bit input colour depth.
- New Z-lid for scanning thick items.
- Front panel button and software for simple e-mail, fax and copy operations.
- Powered and connected by USB for Windows 98/2000 or Mac OS 8.5+.



1200x2400dpi.  
(A3523) GST INC  
**\$258**

#### N1220U Flatbed Scanner

- Amazing 1200 x 2400dpi optical with selectable resolution up to 9600dpi.
- Stylish charcoal and aluminium finish.
- New Z-lid for scanning thick books etc.
- Software for Windows & Mac including OmniPage and PhotoShop LE.



1200x2400dpi.  
(B9935) GST INC  
**\$389**

#### CanoScan D1230U Flatbed Scanner

- A4 1200x2400dpi flatbed scanner - optional 1200x2400dpi film scanning.
- Fast one pass USB scanning.
- Stylish charcoal grey and aluminium design.
- Includes Adobe PhotoShop 5.0LE & OmniPage OCR software for Win. and Mac.



2400x4800dpi.  
(B9840) GST INC  
**\$759**

#### CanoScan D2400U Flatbed Scanner

- Optical resolution of 2400 x 4800 dpi.
- Film adaptor lid - for accurate scanning of 35mm, 2 1/4" and 4"x5" film.
- Outstanding colour accuracy.
- Ideal for professional studios, graphics and design bureaus.



# HP DesignJets

## HP DesignJet 500

Professional graphics printer for 24" wide photo quality ads and graphics.



HP 500PS 42"

HP 500PS 24"

RES: 1200x600dpi  
SPEED: D size line drawings (sec): fast 90/normal 195/ best 360  
Colour images (sq m/hr): 7.9 fast/ 3.3 normal/ 2.0 best  
MEDIA: Coated & glossy paper, technical media. Sheet & roll feed, auto cutter  
SIZES: Sheet: 211mm- 610mm (w) x 211-1897 (l); Roll: 24" (w) x 45.7m (l)  
I/FACE: Parallel, USB  
SIZE: 1.2 x 0.49 x 0.36m; 38.6kg

HP DesignJet 500 24"	(A7234)	<b>\$4,130</b>
HP DesignJet 500PS 24"	(A7233)	<b>\$5,615</b>
HP DesignJet 500 42"	(B1178)	<b>\$6,670</b>
HP DesignJet 500PS 42"	(B8498)	<b>\$7,730</b>

## HP DesignJet 800

Professional graphics printer for 24" wide photo quality ads and graphics.



HP 800PS 42"

HP 800PS 24"

RES: 2400x1200dpi  
SPEED: Prints times as short as 60 seconds (D size prints)  
MEDIA: Coated & glossy paper, technical media. Sheet & roll feed, auto cutter  
SIZES: Sheet: 610mm- 1897mm ; Roll: 24" (w) x 45.7m (l)  
I/FACE: Parallel, USB  
SIZE: Printer in 2 sizes 42 or 24 inches wide

HP DesignJet 800 24"	(B8514)	<b>\$10,060</b>
HP DesignJet 800PS 24"	(B8518)	<b>\$14,500</b>
HP DesignJet 800 42"	(B8513)	<b>\$11,860</b>
HP DesignJet 800PS 42"	(B8519)	<b>\$16,730</b>

## HP DesignJet 5000

Professional graphics printer photo quality unmatched by any other printer

Come in & see one on display @ our Nth Ryde Location!



HP 5000PS 60"

HP 5000PS 42"

RES: 1200x600dpi on glossy media (6 colours:CMYKcm)  
SPEED: max: 46.4 sq m/hr, at max quality 8.27 sq m/hr,  
at productivity 6.32 sq m/hr  
MEDIA: Coated & glossy paper, backlit, opaque, vinyl, canvas...  
SIZES: Sheet: 211mm- 914mm (w) x 559- 1600mm (l);  
Roll: 24/36/42" (w), up to 91.4m (l)  
I/FACE: Parallel, HP JetDirect 610N 10/100 Base TX Print Server  
SIZE: 2.0 x 0.69 x 1.3m; 100kg

HP DesignJet 5000 42"	(B6514)	<b>\$19,590</b>
HP DesignJet 5000PS 42"	(B9792)	<b>\$25,730</b>
HP DesignJet 5000 60"	(B6515)	<b>\$31,235</b>
HP DesignJet 5000PS 60"	(B9791)	<b>\$38,545</b>

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# LaserJet Printers

## HP LaserJet 4550 Series



**HP Colour LaserJet 4550 A4**  
16PPM 64Mb (B2381) GST INC  
**\$3,944**

**HP Colour LaserJet 4550N A4**  
16PPM 64Mb 10/100 (B2382) GST INC  
**\$4,469**

## HP BUSINESS INKJET 2200 SPECS:

Model # C3906A  
Superfast color, 15ppm black, 14ppm color, up to 1200 x 600dpi black & PhotoREt 3 color (up to 1200 x 600dpi), 8MB RAM, 250 sheet bin, 10,000 page duty cycle, ECP Parallel (IEEE 1284) B-type interface

## ALL HP PROMOTIONS

\*Conditions apply, customers must fill out and send a redemption form to receive. Form & conditions available via [www.hp.com.au/HPPromotions](http://www.hp.com.au/HPPromotions)

## HP LaserJet 6L Pro

• 6ppm • economode cuts printing costs by 50% • power save mode reduces energy costs • 18-second first page out • patent instant-on fuser eliminates printer warm-up time • fast return to application • supports a wide variety of media sizes and types (letter, envelopes, transparencies and card stock) • Supports DOS and Windows 3.1, 3.11, 95, 98, NT 4.0 environments

(B4399) GST INC **\$587**



Buy an HP LaserJet 6L Pro Printer between 1 May & 30 October 2001 & receive an additional HP Black Toner cartridge for **FREE**\*

\*Conditions apply, customers must fill out a redemption form, form available via [www.hp.com.au/HPPromotions/](http://www.hp.com.au/HPPromotions/)

## HP LaserJet 1200 Series

**LaserJet 1200 (base unit)** (B9799) GST INC **\$769**

**LaserJet 1200n** (B9958) GST INC **\$1,279**

• 14 ppm A4 (best-in-class) and first page out in less than 10 seconds • increased memory of 8MB of RAM (upgradable to 72 MB) • protected 250-sheet input tray and 10-sheet priority feed tray • improved duty cycle of up to 10,000 pages • instant-on fuser eliminates warm up time

**LaserJet 1220** (B9968) GST INC **\$917**

You can now enjoy the comfort of printing, colour scanning and copying from one machine by simply adding the copier/scanner attachment to your hp LaserJet 1200. Beside enjoying all the best-in-class printing capabilities of the hp LaserJet 1200, you can now take control of your document management with the added benefit of colour scanning and copying.



Buy an HP LaserJet 1200 Printer between 01 Aug & 30 Sept 2001 & receive **\$100 CASHBACK**\*



## HP LaserJet 2200 Series

**LaserJet 2200d (base unit)** (B9956) GST INC **\$1,519**

**LaserJet 2200dn** (B9957) GST INC **\$2,004**

**LaserJet 2200dtn** (B9898) GST INC **\$2,559**

• Improved productivity with faster printing at 18 ppm A4 • best printing resolution of true 1200 x 1200 dpi at full speed • quicker return to application with 133 MHz processor • first page out in 15 seconds with instant on-fuser • print large and complex documents quickly and easily with 8 MB of standard memory (16 MB memory on hp LaserJet 2200dtn) – expandable up to 72 MB • increased duty cycle to 40,000/month



Buy FOUR HP LaserJet 2200 Printers between 01 Aug & 30 Sept 2001 & claim a **FREE Business InkJet 2200**\*



## HP LaserJet 4100 Printer

**LaserJet 4100 (base unit)** (B8399) GST INC **\$2,184**

**LaserJet 4100n** (B8400) GST INC **\$2,944**

**LaserJet 4100tn** (B8401) GST INC **\$3,419**

**LaserJet 4100dtn** (B8402) GST INC **\$3,949**

• Super fast printing at 24ppm A4 print • 250MHz processor ensures quicker return to application • complex documents print faster with 16MB/32MB memory • 12 second first page out • HP Pro-Res & FastRes 1200 dpi print quality at full speed • dynamic RIP-once for faster processing of multiple original prints • duty cycle of 150,000 pages/month



Buy THREE HP LaserJet 4100 Printers between 01 Aug & 30 Sept 2001 & claim a **FREE Business InkJet 2200**\*



## HP LaserJet 3200 Series

**LaserJet 3150** (93899) GST INC **\$1,198**

**LaserJet 3200** (C2332) GST INC **\$1,490**

**LaserJet 3200M** (C4456) GST INC **\$1,799**

Printer, Fax, Copier & Scanner! An ideal business solution for small office, home office (SOHO), small/medium business and top level executives, the hp LaserJet 3200 series is four machines in one. Print, fax copy and scan from one machine and it only occupies 1.6 sq. ft. of your desk space!

Buy HP LaserJet 3150/3200/m Printer between 01 Aug & 30 Sept 2001 & receive an HP Toner cartridge for **FREE**\*



## HP LaserJet 8150 Series

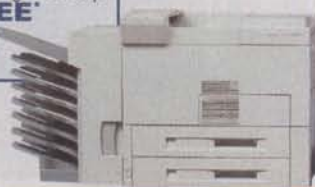
**HP Laserjet 8150** (B1981) GST INC **\$4,324**

**HP Laserjet 8150DN** (B1982) GST INC **\$5,659**

**HP Laserjet 8150N** (B1986) GST INC **\$4,944**

The new HP LaserJet 8150 series is designed to grow with your business and its needs. It delivers high-volume, high-speed black and white prints and copies for small workgroups to large departments. • Fast printing at 32 ppm; 32 Mb ram (expandable to 150 Mb); 300 MHz processor.

Buy THREE HP LaserJet 8150 Printers between 01 Aug & 30 Sept 2001 & claim a **FREE Business InkJet 2200**\*



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# HP OfficeJets & DeskJets

## HP OfficeJet T65

### All In One Scanner/Printer/Fax/Copier

- Up to 11ppm mono and 8.5ppm colour • 75 page memory • Colour fax capability • 100 speed dials with 10 one-touch keys • junk fax barrier, 20 group speed dials fax forwarding • Colour scanning - up to 1200dpi enhanced 300 x 600 optical 24 bit colour • walk-up colour copy, up to 99 copies from original



(84893) GST INC **\$448**

## HP OfficeJet G85

### All Colour: Printer, Copier, Scanner & Fax

Prints at up to 12 ppm black, 10 ppm color using 2400x1200dpi colour with HP photoREt 3, as well as flatbed exceptionally high-quality 36-bit scanning, faster copying speeds, and upgradeable networking capability which allows one unit to be shared by several PCs. Each model combines a color printer, scanner, and copier. Also a convenient walk-up color fax.



(A0062) GST INC **\$1,098**

## HP DeskJet 990C

### Best Photo-Quality plus Premier Business Printing •

- Infrared printing from PDAs, notebook computers, and other mobile devices. • Up to 17 ppm in black, 13 ppm in color
- Optical sensor detects paper type, then selects the ideal print mode HP PhotoRet 3



(B1967) GST INC **\$703**

## HP DeskJet 930C

### Compact Photo-Quality Colour InkJet Printer

- Alternative 2400x1200dpi mode on photo paper with HP PhotoRet 3
- Excellent results on all types of media in all modes
- Prints up to 9ppm black and 7.5ppm colour



(95761) GST INC **\$255**

## HP DeskJet 1125C

### Great Value A3 Business Printer

The HP DeskJet 1125C is an affordable, entry-level wide format printer, designed to meet the needs of small business and home office users. • Fast printing without compromising print quality - up to 7 ppm black and 5.5 ppm color.



(A2290) GST INC **\$549**

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# HP ScanJets & CDRW

## HP CD-Writer 8230e Drive

The HP CD-Writer 8230e drive is an external CD-Rewritable drive with 4x4x 6x performance. Use the drive to create, share, and store data, photos, music, and more on high capacity CDs. Record up to 650 megabytes (MB) of data with CD-writeable (530 MB formatted) and 650 MB (up to 618 MB formatted) with CD-readable.



(A9131) GST INC **\$485**

## HP CDRW 9140i & 9500i

Model	9140i	9500i
Speed	8x4x32	12x8x32
Copy & create universally readable CDs	HP MyCD	HP MyCD
CD creation using drag & drop	Adaptec Direct CD 3.01	Adaptec Direct CD 3.01
High speed CD-RW disc formatting	HP Fast Format	HP Fast Format
Full system backup	HP Simple Backup	HP Simple Backup
Multimedia organiser		Broderbund Multimedia Pro
Create stationery, greeting cards & more		Corel Print Office 2000
MP3 downloads	HP Music Jukebox	HP Music Jukebox
CD labelling	CD labeler	CD labeler
Included media	1xCD-R	1xCD-R, 1x high per, CD-RW
Buffering	2MB	4MB
Able to format CD-RW disc under 3 minutes	Yes	Yes
Download MP3 files & store on CD	Yes	Yes
Write & read high performance CDRWmedia	Yes	Yes
Write & read normal CD-RW media	Yes	Yes
Part #	(A8090)	(A8087)
Inc GST	<b>\$325</b>	<b>\$554</b>



### Easiest to Install & Use!

You can create data CD's, audio CD's, photo CD's and multimedia CD's. You can either write once (CD-R) or erase and re-write (CD-RW). Each CD holds up to 650MB of data or 74mins of audio.

## HP ScanJet 2200c

Value-packed and easy to use! Photos, text and more from HP's slimmest scanner

- Scan & copy in colour at the touch of a button
- USB port easy installation
- 600 dpi optical - 42 bit colour
- supports Windows 98, 2000 Pro & Me
- Precision Scan LTX software

(C5896) GST INC **\$195**



## HP ScanJet 4400c

Superior scan at a touch!

- Dual sensor technology
- 1200dpi optical - 48 bit colour
- instant photo formatting feature
- scan-to-CD feature helps you scan and archive more photos and images on CD-ROM with your CD-writer
- email, copy & photo reprint buttons

(C5904) GST INC **\$Call**



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## Think in Colour

### NEW PRODUCT

# Phaser 860

### Truly brilliant colour

An exceptional network-ready powerhouse A4 printer. With superior colour and **LIFETIME FREE BLACK** it's great value for money.

- High performance solid ink
- A4 colour/mono
- 16ppm colour. 1200dpi max
- 16ppm mono. 1200dpi max
- First page out 10 sec colour
- RAM 64 std; 256 max
- Top 3 models Network ready
- 4 Models to choose from

### LIFETIME FREE BLACK

- its great value for money



RENT\* \$Call (C4255) GST Inc **\$Call**

RENTSMART

SEE PAGE

**17**

FOR MORE  
DETAILS

The figures quoted are based on a per week basis over 3 years. T.A.P. Terms & Conditions apply.

### FREE BLACK

have as much black ink as you need

with the Purchase of Phaser 860 printer (C4255)



### Phaser 790

New Standard graphics

The ultimate graphics professional device with superior colour management tools and the ability to handle any challenge, full tabloid bleed page size and varied media.

- Laser
- A4/A3 colour/mono
- 6ppm colour
- 20ppm mono
- First page out 12sec colour
- RAM 64 std; 512 Max
- Network ready
- 2 Models to choose from

RENT\* \$118.78  
(B2972) GST Inc

**\$14,500**



### Phaser 1235

Bridges the speed gap...

...between mono and colour printing, you receive top quality with great speed and reliability.

- Single pass LED
- A4 colour/mono
- 12 ppm colour. 1200dpi max
- 20 ppm mono. 1200dpi max
- First page out 18sec colour
- RAM 64 std; 512 max
- Network ready
- 3 Models to choose from

RENT\* \$70.01  
(B2971) GST Inc

**\$8,069**



### Phaser 2135

Fastest all-in-one device

Never again choose between printing fast or colour — or need a separate mono printer. Now everything created can be printed in-house.

- Single pass LED
- A4 and A3 colour/mono
- 21 ppm colour. 1200dpi max
- 26 ppm mono. 1200dpi max
- First page out 18sec colour
- RAM 64 std; 512 max
- Network ready
- 4 Models to choose from

RENT\* \$124.52  
(B8459) GST Inc

**\$15,200**



### Phaser 750

Great colour and value

Superior laser print quality, exceptional value-packed network performance, meeting all the demands for your customer's business, every day of the week in colour.

- Laser
- A4 colour/mono
- 5 ppm colour. 1200dpi max
- 16 ppm mono. 1200dpi max
- First page out 40sec colour
- RAM 64 std; 256 max
- Network ready

• 4 Models to choose from  
RENT\* \$45.41  
(A1401) GST Inc

**\$4,859**

Ask  
About...



- ☐ Extend to a total of 3 Years Return to Base
- ☐ Extend to a total of 5 Years Return to Base
- ☐ Upgrade Return to Base of Warranty Extension to On-Site

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## Camedia Digital Cameras



**Fast  
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### CAMEDIA C-1 **NEW**

#### Easy-to Use Stress-Free Shooting

Just pick it up and shoot, then check your picture on the LCD monitor. With a 1.3 Megapixel CCD and a sharp autofocus 4.5mm lens you will capture quality images quickly and easily. The C-1 is USB Storage-Class compatible - connect to a PC and download your images. 8MB Smartmedia card is supplied - optional cards up to 128MB are available. Other features include 2x Digital Zoom, Exposure Compensation, Auto & Preset White Balance and choice of three image sizes.



(C5850) GST Inc: **\$699**

### CAMEDIA C-100

#### Expand your creative abilities

Using the added features like:  
• six flash modes • Motion JPEG, Black & White or Sepia modes • Panorama function • 1.3 Megapixel CCD • Focus Free 4.5mm lens • 2x Digital tele function • uses SmartMedia cards • USB Storage-Class interface for download.



(C5866) GST Inc: **\$Call**

### CAMEDIA C-700

#### Unbelievably compact size

• f2.8-3.5 10x optical zoom lens, range of 5.9-59mm • Portrait, Landscape or Sports modes • accurate focussing and exposure system • 2.1 Megapixel CCD • Uses Smartmedia cards • USB • LCD viewfinder and monitor • Motion JPEG Image and Sound recording • Slide-Show and Picture Effects modes.



(C5851) GST Inc: **\$1,649**

### CAMEDIA C-960

#### Feature-packed but compact

• 1.3 Megapixel CCD and Super-Sharp 3x Optical Zoom (equiv. of 35-105mm on 35mm) • Five image modes including non-compression - from production quality to email • Uses Smartmedia cards - 8MB supplied with optional cards to 128MB available. PAL video output - view your shots on TV.



(C5852) GST Inc: **\$849**

### CAMEDIA C-990

#### Stylish, gold coloured body

• Super high resolution 2.1 Megapixel CCD • 3x Optical Zoom lens • Five levels of image quality including non-compression, Motion JPEG, Spot Metering and 1.5fps Sequence mode • 8MB memory buffer • Uses Smartmedia memory cards • download is via cable or optional USB card reader, Flashpath floppy disk or PCMCIA adapter



(B7828) GST Inc: **\$1,099**

### CAMEDIA C-2040

#### Choice of exposure

• 2.1 Megapixel digital camera • fast f1.8, 3x Optical Zoom lens • Program, Aperture/Shutter Priority and Manual gives you the choice of exposure to match the conditions • Motion JPEG image recording facility • Uses Smartmedia cards • USB Storage-Class interface for download.



(C4174) GST Inc: **\$1,399**

### CAMEDIA C-3040

#### Advanced Features

• 3.3 Megapixel CCD • bright f1.8, 3x Optical Zoom lens • The wide range of exposure and effects options such as Motion JPEG Image and Sound Recording add to the versatility of this camera • Uses Smartmedia cards • USB Storage-Class interface for download.



(C5853) GST Inc: **\$1,999**

Not all items are in stock at all stores but can be ordered!

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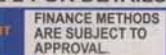


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computer  
needs!

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**52**

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## Printers that mean business



### PAGEPRO 1100L

**Fast and inexpensive for small workgroups**



The award winning PagePro 1100L – A4 monochrome laser is the right business solution. It's fast at 10 pages per minute, and offers a high quality 600 dpi. It's also inexpensive as a personal printer.

Print Speed	A4 10 ppm mono
Resolution	1200 x 600 dpi resolution
Interface	Parallel
Compatibility	Windows 3.1x/95/98/2000 and NT

(A1438) GST INC **\$539**



### PAGEPRO 4100W

**Flexible desktop laser printing for the office**



The PagePro 4100W provides the flexibility to serve today's wide array of office environments. It combines quick 18 page per minute print speeds and superior 1200 x 600 dpi print quality output in seconds.

Print Speed	A4 18 ppm mono
Resolution	1200 x 600 dpi resolution
Interface	Parallel
Compatibility	Windows 95/98/2000 and NT 4.0

(C0310) GST INC **\$1,298**



### MAGICOLOR 2200 DESKLASER



Affordable A4 colour for Windows workgroups. The low purchase price and operating costs of the magicolor 2200 DeskLaser make it affordable for any business requiring colour and black & white printing. Designed for compatibility with Windows 95/98/Me, NT 4.0 and Windows 2000, the magicolor 2200 DeskLaser is the perfect printing companion for Windows workgroups.

Print Speed	5 ppm colour, 20 ppm mono
Resolution	1200 x 600 dpi resolution
Interface	10BaseT/100BaseTX auto sensing Ethernet Bi-directional IEEE Parallel
Compatibility	Windows 95/98/2000/Me, NT 4.0

(C0669) GST INC **\$2,995**



### MAGICOLOR 6100 DESKLASER



The Magicolor 6100 DeskLaser offers outstanding performance, printing up to 24 pages per minute in monochrome and up to 6 in colour. It's competitively priced to replace those black and white only printers. And when it comes to flexibility, the DeskLaser is as versatile as they get. This colour laser printer supports A4, A3 and up to 13" x 19", and even has automatic duplexing capabilities.

Print Speed A4	6 ppm colour, 24 ppm mono
Print Speed A3	3 ppm colour, 12 ppm mono
Resolution	1200 x 600 dpi resolution
Interface	10BaseT/100BaseTX auto sensing Ethernet Parallel, Serial
Compatibility	Windows 95/98/2000/Me, NT 4.0

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### Adobe Design Collection 4.0

Adobe Design Collection contains the following four leading-edge design & publishing applications in one fully integrated suite: Adobe InDesign™ V1.5, Adobe Photoshop® V6.0, Adobe Illustrator® V9.0, Adobe Acrobat® V5.0. Together, these programs give you everything you need to create & produce professional images, illustrations, & layouts, and to publish documents across media.



(C2965) GST INC:  
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### Adobe Publishing Collection 9.0

The Adobe Publishing Collection brings together four of the most powerful software programs available for creating, assembling, and delivering graphically rich designs for print and the Web: Adobe Photoshop® 6.0 (with Adobe ImageReady™ 2.0), Adobe Illustrator® 9.0, Adobe PageMaker® 6.5 Plus, and Adobe Acrobat® 4.0.



(B1154) GST INC:  
**\$2,325**

### Adobe Web Collection 3.0

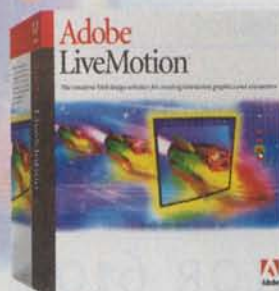
The Adobe Web Collection is a comprehensive, tightly integrated software suite that gives you the power to design extraordinary still and interactive Web graphics, optimize those graphics for efficient downloading, and build dynamic Web sites that support the latest technology. Includes three award-winning Adobe applications: Adobe GoLive™ 5.0, Adobe Photoshop® 6.0, and Adobe Illustrator® 9.0.



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### Adobe LiveMotion 1.0

The intuitive Web design solution for creating interactive animation and graphics



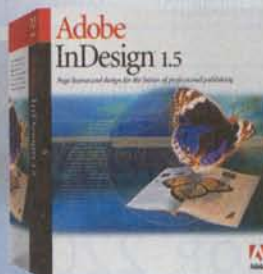
Adobe® LiveMotion™ is the solution for authoring high-impact, interactive elements and engaging animation for the Web. It enables designers to create everything from individual, dynamic Web graphics to complete pages that incorporate motion, sound and interactivity - Work with maximum efficiency while exercising unlimited creative freedom.

(A1519) GST INC: **\$349**

### Adobe InDesign 1.5

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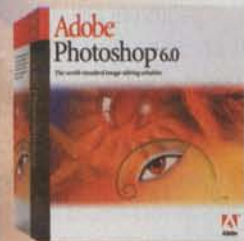


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### Adobe Photoshop 6.0

The world standard image editing solution

Adobe Photoshop® 6.0 software introduces the next generation of image editing with powerful new features that offer something for every user. Now combine vector drawing tools and new layer design features that greatly enhance your creative options. Produce the highest quality graphics with an expanded Web tool kit that includes more timesaving features as well as ImageReady™ 3.0 software for advanced Web production tasks. Master the power of Photoshop faster with user-interface enhancements that make it easy to take full advantage of the comprehensive tool set.

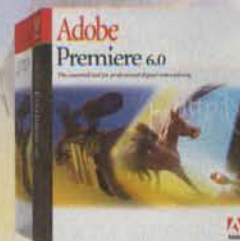


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(99749) GST INC: **\$689**

### Adobe Open Options Transactional Licence Program

The essential tool for digital video editing

The Adobe® Open Options Transactional License Program (TLP) makes it easy for organizations with as few as ten workstations to participate in volume purchasing. It offers ease of entry, covers most Adobe products, and is available worldwide. The TLP is open to corporate, government, education, and small business customers.

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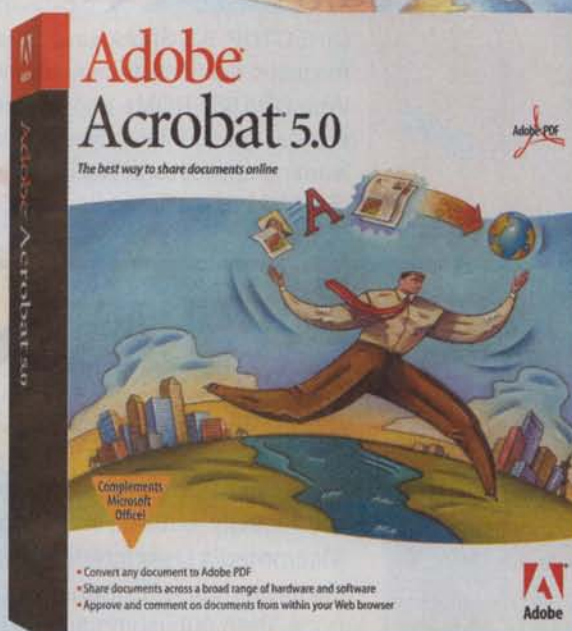
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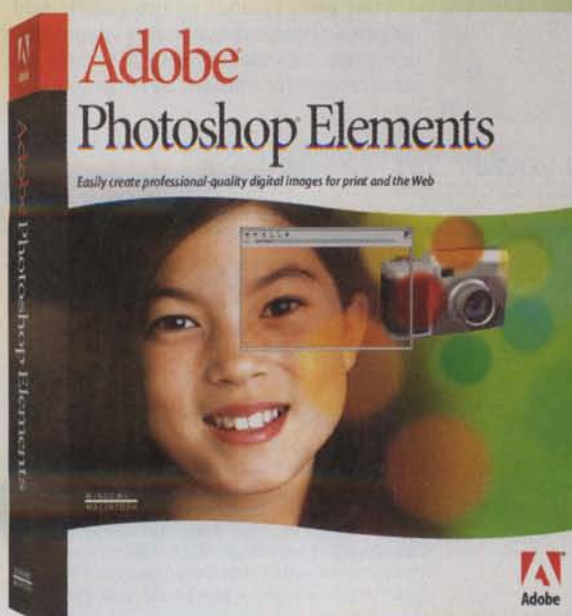
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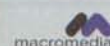
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## Dragon NaturallySpeaking Preferred 5.0



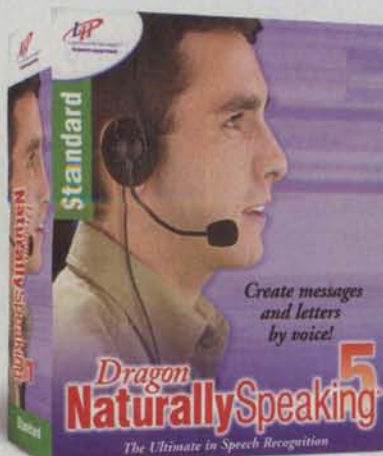
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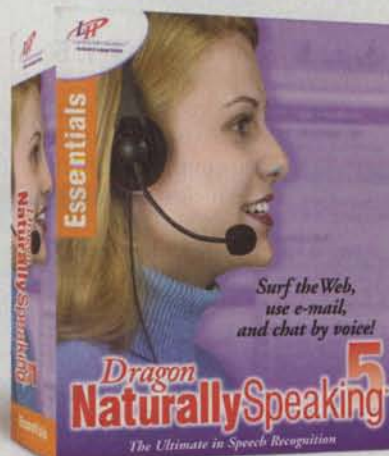


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Perform complex masking in a fraction of the time with Corel KnockOut 1.5® masking software. This extraordinary application lets you preserve fine image details that were once impossible to mask precisely, including blurred or out-of-focus edges, hair, smoke, water, glass and shadows.



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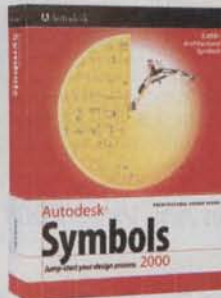
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Choose AutoCAD LT® 2002 to read, share, and generate design data more accurately, collaboratively, and productively. It's the only 2D CAD program that streamlines collaboration through a comprehensive Internet toolset and 100% DWG compatibility with AutoCAD® 2002-based products. This yields faster cycle times, reduced costs, and—with enhancements like automated associative dimensioning—more efficient design creation.



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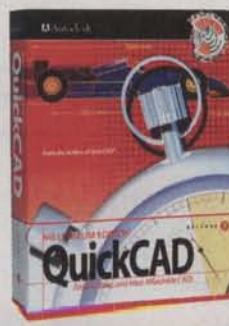


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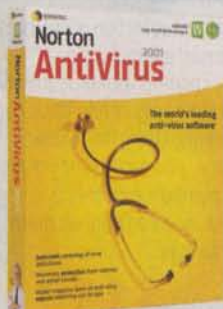
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**Norton AntiVirus 2001**

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**Norton AntiVirus 7.5 10 User Pack** for small managed networks consisting of 1 server and up to 9 workstations, Norton AntiVirus 7.5 Small Business Solution for 10 Users, provides automated, centralised virus protection and management.

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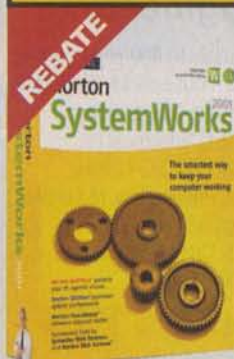
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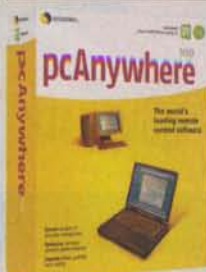
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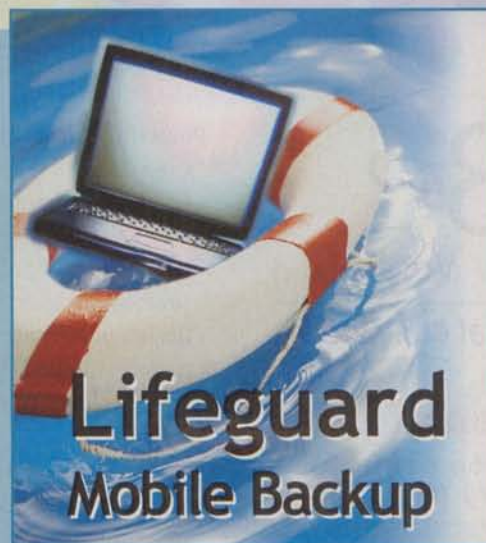
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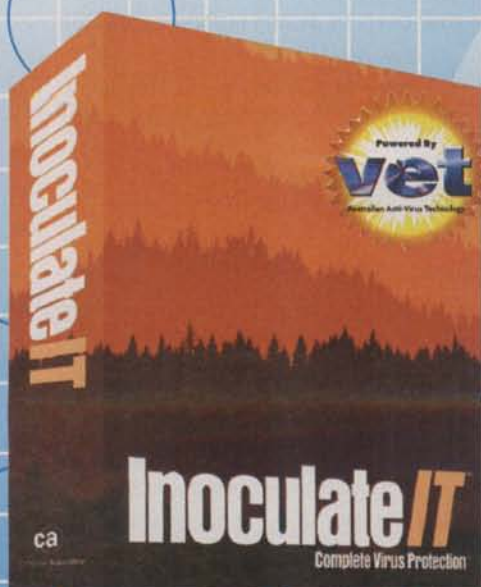
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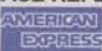
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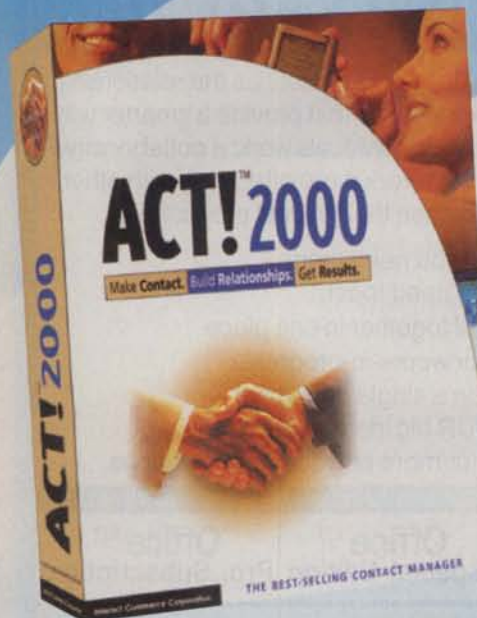
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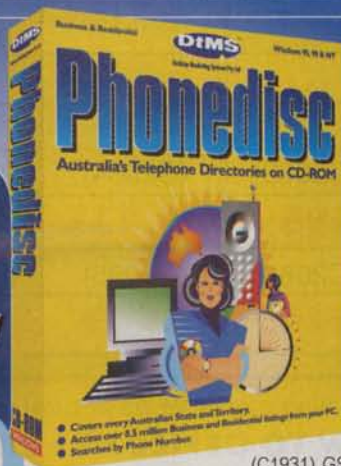


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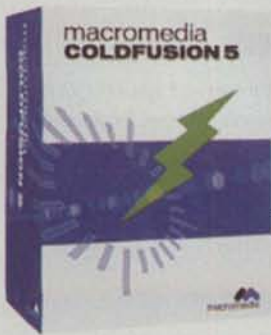
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**Macromedia ColdFusion Server 5**

This Web application server is at the heart of every ColdFusion application. It has built-in application and infrastructure services and an extensible architecture. There are also 12 useful ColdFusion 5 tips and tricks on CD 2.

**Java 2 SDK Standard Edition 1.3.1**

The Java 2 Software Development Kit (SDK) provides all the essential tools, runtimes and APIs needed by Java programmers.

**Developer tools**

**Borland®** Whether you're a professional hacker or you're planning to create your very first program, you'll find some neat toys in this month's feature. There are thousands of tools available for developers, so APC has been very selective. We've included some classics as well as a couple that might surprise even the most jaded programmer.

**Web development tools**

This month, APC rounds up the latest and greatest Web development tools for CGI/Perl, Java, XML, ASP and PHP. This collection of tools gives you everything you need to start building your own ecommerce site, database-driven Web site or Web applications. Also included are tools for creating CSS, online forms for site feedback and DHTML coding utilities.

**Windows 2000 Service Pack 2**

The latest updates to the Windows 2000 operating system are included in this month's Patch Panel.

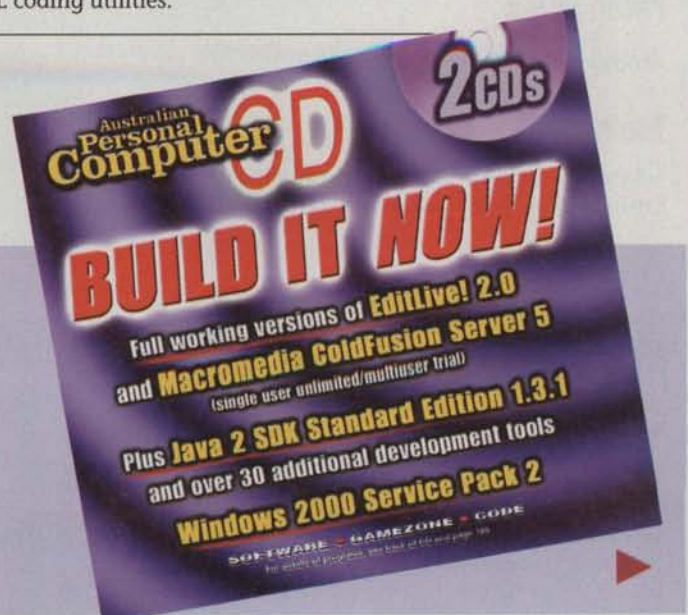
**Your guide to the cover CDs**

The APC cover CDs complement the magazine and [apcmag.com](http://apcmag.com). Each month's disc collection features software related to articles in that issue, as well as special CD-only features and Web browsers.

Each piece of software includes instructions on whether you need to unzip the file before installing it, and most also include README files.

The CDs were created in HTML. You do not need any special software to access them, other than a standard browser.

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## APC August CD contents

### CD 1

#### Workshop

**Windows:** Adobe Acrobat 5.0.1, Backup to CD-RW 3.0, BearShare 2.2.3, DHTML Menu Builder 2.8, EliteTyping 4.2, EQuill 3.0, GoZilla 3.9.3, JPEG Optimizer 3.15, NetPeek 3.10.200, PhotoJam 2.0, PlantStudio 2.01, TimeWatcher 4.12

**Linux:** Apollo 1.1, AviFile 0.6, chkrootkit, Gnome SmsSend 1.4, Gnome Transfer Manager 0.49, Iridium Firewall 1.4.9b, Joydesk Business Edition 2.5, Powertweak 0.99, Rescue Is Possible Zdisk 2.0, RPM Package Builder 0.17, SmsSend 2.6, TightVNC 1.1p9, VMware 2.03, xawtv 3.43

**Mac:** Contact Keeper 3.1, FoldersSynchronizer 2.1.2, FontChecker 10.1.5, illumineX 1.0, Interarchy 4.1, Macintosh Explorer 2.0, Notes 1.3.4, Palm Desktop for Mac 2.6.3, Pepper 3.6.4, Web Album Wizard 1.3

**OS/2:** HFS/2 0.10, Marauder 3, PMView 2000 2.20, Win95Key 2.10

**PDAs:** Anatomy, Archon, Encarta Pocket Dictionary, HomeLoan 1.4, InfoDB Tools, IRDAsh, Journal Pro, Loan Wizard, Miniature Golf, NumPad, OutALine, PhoneMate, Remote Display Control for Pocket PC, SplashMoney, SuperNote

#### First Take

QuikSync 3.0

#### Patch Panel

Windows 2000 Service Pack 2

#### Toolkit

Adobe Acrobat Reader 5.0, Aladdin Stuffit 5.0, Aladdin Stuffit Expander 6.01, Audiogalaxy Satellite, Downloader for X 1.26,



Eudora 5.1, GoZilla Free 3.92, ICQ 2000b 4.63 Build 3279, IglooFTP PRO 1.2, Interarchy 4.1, LinZip 1.1, mIRC 5.82, RealPlayer 8.0, smIRCle 1.0.1a23, Windows Media Player 7.1, WinZip 8.0, WS\_FTP LE 5.08

#### GameZone

Cossacks: European Wars

#### Browsers

Microsoft Internet Explorer (32-bit) 5.5, Microsoft Internet Explorer 5

### CD 2

#### Features

EditLive 2.0 (full working version)  
Java 2 SDK, Standard Edition 1.3.1  
Macromedia ColdFusion Server 5 (single user unlimited/multiuser trial)

#### Development tools

3D Rad 2.9, ActivePerl 5.6.1 build 626, AppleScript 1.3.4 SDK, Bloodshed Dev-C++, Borland C++Builder Compiler 5.5, Borland Turbo Debugger 5.5, Covigo Studio 2.6, Cygwin 1.3.1, Liberty BASIC 2.02, Windows Registry Guide 3.0

#### Web development tools

ASP Table Wizard 1.00, asp2php 0.75.9, ASPEdit 2000 b14, CGI\*Star Pro 3.8, Ch-Ching 2.67r7, CodeCharge 1.1.16, Codewhiz Editor 1.5, DHTML Menu Builder 2.8, Easy XML 1.0, ecBuilder Pro 5.0, Edit Revolution 2.01, EditPlus 2.10c, FormSaver 1.7.5, Jext 2.11, JPad Pro 4.0, Macromedia Dreamweaver UltraDev, Mozquito Factory 1.52, OmenTree 1.0, Perl Builder 2.0, PHP Triad 1.02b, SoftLite ScriptWorx 4.0, Schema-Script Interpreter 1.00.0006, The Shopping Cart 1.1, XML Spy 3.5, XMLwriter 1.21, XPublish 2.0a

## How to run the CDs



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# Fight your own battles

## Cossacks: European Wars

In the past, turn-based strategy games and real time strategy (RTS) games were mutually exclusive genres. Most war sims (such as the Panzer General series) use the turn-based system to ensure that every move can be properly thought out and implemented. In contrast, RTS gamers often find their battles raging at such a fast pace that the only strategy possible is that of building units as quickly as possible. Cossacks, from CDV Software Entertainment is primarily an RTS game, but its strong emphasis on the planning and execution of precise military manoeuvres means that the line between RTS and turn-based games is blurred.

control and countless individual units and buildings, there's a lot to learn. Fortunately, the game has an effective tutorial that makes learning easier.

Tutorial topics include managing your economy, building cities, controlling your units and basic military strategies. Obviously, Cossacks' main emphasis is on warfare, but empire building and resource management also play a vital role. In most RTS games, resource collection simply means collecting enough resources so you have money to build units and infrastructure.

However, Cossacks places a far greater importance on this area of the game and has an amazing six resources, namely gold, wood, coal, stone, iron and food. An insufficient supply of any of these resources can have dire consequences; mercenaries will mutiny when not paid, musketeers cannot shoot without iron for bullets, and a shortage in food results in a crippling famine. These resources can be traded at the unique marketplace. Researching other original structures such as academies, blacksmiths and stables can also help you obtain greater efficiency from your farms and mines. A great variety of buildings are available for construction in Cossacks. The continuous cycle of upgrading and improving them makes it easy to become too focused on building up your own impressive city.

Empire building is not the only enjoyable aspect of Cossacks. The real satisfaction in the game comes from participating in enormous battles, and inflicting humiliating defeats on your enemy. To achieve this end, there are many different units available to build an army. These range from pike men, infantry and archers to cannons, howitzers and mortars. You can train all units in various drills so that even the weakest units can participate in combat effectively.



Set between the 16th and 18th centuries, Cossacks recreates famous wars of the period, including the Northern Wars and the Thirty Years War. There's a strong emphasis on historical accuracy, and an in-game encyclopedia ensures that all units, battles and nations can be properly researched before they come up in combat. With 16 different countries to

Simply building huge armies does not necessarily result in victory. Small outfits with tight formations and superior tactics often humble opponents three times their size. Tactics are only limited by your imagination, but use of the true 3D landscape is essential, as the hills provide cover for your infantry and extra range for the artillery.

Enhancing the game's tactical flexibility is the inclusion of officers and drummers, who can order units into military formations such as line, square and box arrangements.

With the incredible graphics, spine-tingling soundtrack and support for up to 8,000 units in any one map, large-scale battles in Cossacks are truly a sight to behold. Battles with fellow gamers are equally impressive, and as long as you have a sufficiently high bandwidth connection, online games with up to seven players are also possible.

Cossacks' fast-paced combat, superbly crafted resource management and infinite strategic possibilities bring RTS and pure strategy together. The European Wars are raging once again, so choose your allegiance and relive history your own way.

*Alan Crawford*



**Contact** QV Software  
**Phone** (02) 9748 2555  
**Online** [www.cossacks.com](http://www.cossacks.com)  
**Price** \$98.95  
**Requires** Pentium 233, Windows 95, Windows NT, 32M RAM  
**Classification** G(8+)  
**Rating** ■■■■■■■■



## Summoner

Summoner is a 3D role-playing game that tells the story of a young boy named Joseph. From generation to generation, special powers have been passed down through Joseph's family, and he is the chosen one for his time. Inexperienced in the use of these powers, he mistakenly summons a demon which is beyond his control. After the demon has ravaged his tiny village, he is banished, and must try to atone for his misdeeds. This is where the adventure begins.

Summoner garnered a huge following in its development stages. Gamers eager to test the latest offering from Volition overloaded the Web sites upon release of the demo. But how does Summoner actually play?



This title has a distinctive action-oriented feel, more so than other RPGs. It uses a third-person perspective that can be changed to a top-down view (although top-down just didn't seem sufficient). For most of the game, the third-person view works quite well, but sometimes the camera chooses the wrong perspective. The battles are in real time, but usually the computer AI takes care of your character's fighting techniques. You can instruct the characters on who to fight, but not when to swing their weapons.

The game comprises an overall mission to gather the summoning rings from the four corners of the world. However, this mission consists of smaller quests and sub-quests that can sometimes be totally unrelated to the game's plot. Sometimes the sub-quests can build up too quickly, and there are moments when it can get pretty confusing as to where you should go or what you should do next. Character development is imperative to the success of the mission and you are encouraged to switch between characters to keep building up an individual character's AI.

Overall, this is a classic RPG; one that will appeal to fans of both Vampire and Diablo. Perhaps because this title was origi-



nally developed for the PlayStation2, the PC version is lacking in some areas. The style of the game has been simplified to entertain the casual gamer, but it's still satisfying for hardcore fans of the genre.

Ryan Shaw

### Contact THQ

Phone (03) 9573 9200

Online [www.summoner.com](http://www.summoner.com)

Price \$89.95

Requires Pentium II 400, Windows 95, 64M RAM

Classification MA(15+)

Rating ■■■■■■■■

## Lego Island 2

The Lego software titles released so far (including chess, railroad and racing games) have been a mixed bunch, but most of them have had one thing in common: very little actual building with Lego blocks.

You start Lego Island 2 with the intention of building your house, but you don't actually do any of the building or designing. Instead, you end up delivering pizzas so that others will do the building for you.

As in the original game, you take on the role of Pepper, a pizza delivery boy on Lego Island. Initially, your job is to deliver pizzas, but when the wrong pizza gets delivered to the imprisoned Brickster

(another holdover), he escapes, and you must help to catch him. In practice, the game is effectively a 3D platformer of the Mario type. Gameplay is slow and methodical, broken up by a variety of different sub-games, including variants of Whack-A-Mole and racing games.

Lego Island 2 looks a treat, mimicking the appearance of classic Lego; when things break, they 'rebuild' from individual Lego boxes. Pepper is easy to control, if a little slow. Even if he switches to his skateboard, or any of the many vehicles he can hop into, he still plods along at much the same pace.

The game is a little too open-ended.

Younger children (its intended audience) will like the slower pace and number of things to explore, until they have to get from one side of the island to the other, which is a long trudge. We also found that it was possible to get stuck in some landscape features, but unlike real Lego, we couldn't simply remove the pieces and start again.

Speaking of real Lego, Lego Island 2 is the first software product from Lego for a while to include actual Lego in the packaging, in the form of a keychain.



This seems great, until you open the package and realise the Lego man on the chain has been glued together so he can't be disassembled. Boo.

Angus Kidman



### Contact Lego

Phone (02) 9428 9666

Online [www.lego.com](http://www.lego.com)

Price \$49.95

Requires Pentium II 266, Windows 95, 650M hard disk space

Classification G

Rating ■■■■■■■■



## Evil Dead: Hail to the King

Bruce Campbell should have been given an Oscar by now. Not only has he given us such gems as *The Adventures of Brisco County Jr* and the opening minutes of *From Dusk Till Dawn 2* and *Congo*, but he's also directly responsible for one of the best horror trilogies ever, the *Evil Dead* series. If it seems as if we're rambling about an actor rather than the game at hand, you'd be right. There's a reason: Campbell the actor is a B-grade movie genius, whilst *Evil Dead: Hail to the King* is an abomination of a game, coming from a licence with almost unlimited potential. What you get is a Z-grade *Resident Evil* rip-off — and that's an insult to Z-grade *Resident Evil* rip-offs.



Things get off to a bad start with the graphics. The important venues, such as the log cabin, are well represented, but the character of Ash walks as if he has a broomstick implanted somewhere very personal. The undead are even worse: generally unconvincing 3D models with, at best, three frames of animation. Collision detection in combat is a joke, with Ash swirling his chainsaw in the general direction of an enemy halfway across the screen, and hitting. Enemies re-spawn randomly but constantly, so heading from area to area is a chore of monster-avoiding and incredibly dull combat. The G key is mapped to a random Campbell-intoned insult, which will make you smile — until 30 seconds later, when you've cycled through all of them. Puzzles are rudimentary, but you'll be too busy dodging the 90 or so monsters that each screen throws at you without respite. As it's a *Resident Evil* clone, odd camera angles are all the rage, but where Capcom's series tends to accentuate the scare factor, *Evil Dead* just uses bad angles to annoy the crap out of you.



Now, back to the merits of Bruce Campbell's acting career...

Alex Kidman

**Contact** THQ  
**Phone** (03) 9573 9200  
**Online** [www.evildeadgame.com](http://www.evildeadgame.com)  
**Price** \$89.95  
**Requires** Pentium II 300, Windows 98, 48M RAM  
**Classification** MA(15+)  
**Rating** ■■■■■■■■■■

## Sudden Strike

Cossacks, from CDV software, has taken the real time strategy (RTS) world by storm. Not content with one successful title, the same developer has also released *Sudden Strike* in an attempt to dominate the strategy market. Set during WWII, *Sudden Strike* enables you to control various armies in the battles surrounding the Normandy invasion. Allied, Soviet and German campaigns are all available, and with nearly 50 missions and a bonus disc, this is one title you won't finish in a hurry.

The game places a much greater emphasis on strategy than its illustrious sibling does, and it offers no empire-building or resource management components. This

means that a set number of units are assigned to you at the start of every mission, and without careful planning, a once-impressive army can quickly be reduced to a mere handful of men.

The missions range from stealth operations which rely on just a dozen soldiers, to large-scale battles featuring up to 1,000 units. An incredible variety of units are available, ranging from infantry such as snipers and commandos, to tanks including Panthers and Sturmtigers, plus bombers and anti-aircraft guns.

The game's unique yet effective control system allows precise handling of these units, with complex waypoints and orders such as 'take cover', 'stand ground' and 'disperse' all issued effortlessly. The 'take cover' command can often be seen as an easy way out for novice players who find themselves under heavy fire. Fortunately, overuse of this tactic soon abates when one realises that the trees and scrub your troops are using for cover can be burnt to the ground in a matter of seconds.

*Sudden Strike*'s amazing destructible environment, countless units and numerous missions ensure it is well worth a look



for any WWII enthusiast. The incredible underlying strategy elements make the game an essential for all RTS gamers.

Alan Crawford

**Contact** QV Software  
**Phone** (02) 9748 2555  
**Online** [www.suddenstrike.com](http://www.suddenstrike.com)  
**Price** \$98.95  
**Requires** Pentium 233, Windows 95, 32M RAM  
**Classification** G(8+)  
**Rating** ■■■■■■■■■■





## Gamespy

● This year's Electronic Entertainment Expo (E3) had strong showings from numerous publishers and the next year looks like another electrifying one for PC gamers. Stand-out RPG titles included: *Morrowind* — Bethesda's next *Elder Scrolls* game (below); *Neverwinter Nights* — the first true-3D RPG from genre veterans Interplay; and LucasArts' visually stunning MMORPG, *Star Wars Galaxies*.



● In the action department, there was the long-awaited *Max Payne* as well as *Unreal 2* and the Quake III engine-based *Medal of Honor: Allied Assault* — the first PC game based on the popular PlayStation WWII 3D shooters (below).



● Hot strategy titles included additions to well-worn series, such as *WarCraft III* and *Civilisation III*, along with a few newcomers, such as Liquid Entertainment's *Battle Realms* (set in feudal Japan) and Sierra's new past and future-spanning game, *Empire Earth*.

● E3 also saw the announcement of the Xbox's US release date — November 8, 2001. The unit will be priced at \$US299. Australian details are yet to be finalised, but it will hopefully be released towards the end of the first quarter of 2002.

## Tropico

If you've ever played a game of *SimCity* and bemoaned the fact that you can't simply take all those complaining citizens, line them up against the wall and spray them with bullets, then *Tropico* may be the game for you. *Tropico* is *SimCity* with corruption, and you play the role of dictator — although not necessarily for life.

Being dictator isn't all slush funds and your pick of the farmers' daughters, however. The people still expect their conditions to improve, so you must undertake the usual rounds of building houses, industries and businesses. The setting is the remote Caribbean island of Tropico, so the tourist industry is prevalent. The main differences between *SimCity* and *Tropico* are due to the methodologies you employ. Need a bit of spending money? Sign an order giving 10% of all building funds to your private Swiss bank account. Worried about the upcoming elections? Simply have the leader of the opposition eliminated, or fix the voting results. Everything you do will affect how the people perceive you — and each and every citizen has their own opinion.

Added to all this is the presence of the USSR and the US at the height of the Cold War — obviously where the *Tropico* designers derived their inspiration. Entertain the Americans and tourists will come flocking — as well as crime. The Russians are poorer, but are looking for a beachhead or two to set up a missile base. Whichever side you play, your own citizens' opinions about communism and capitalism will also play a part.

The graphics in *Tropico* are not all that exciting. Think *SimCity* 2000 level, and not much else. However, for all its graphical simplicity, *Tropico* still requires a large amount of memory to run, and even on a Pentium II 350MHz with 128M of RAM, things were distinctly choppy in places. We're still not sure why; it doesn't make a huge request of the graphics architecture, even with a few neat spot effects.

One of the hardest things to get right in a management sim is the interface, and *Tropico* makes a decent, if flawed, stab at it. Building and ordering events is easy enough, due to the basic interface,



but there were several controls missing that would have been exceptionally useful, especially the ability to target specific buildings. Your builders work outwards in a radius from the construction centre. While you can assign priorities to buildings, there's no way to prioritise a building if it's too far away, which can lead to repetitive citizen complaints about not having an airport when you're waiting for the builders to come in and build it.

*Tropico* is very open-ended. There's a set of predesigned scenarios (which tend to be incredibly hard), along with a mission generator, where any of the specific variables (the political climate, the size of your island and so on) can be set. Some people may be a touch offended by *Tropico*, as you choose your own characteristics by modelling yourself after a particular dictator. Does anyone really need to be 'Baby' Doc Duvalier? If setting limits and conditions isn't your thing, it's possible to play a completely open-ended game with no set victory requirements at all.

*Tropico* is a lot of fun for control freaks. Graphically it isn't spectacular, and it can lag badly; but it is very engrossing, and even has a bearable score — a true rarity in simulation games.

Alex 'Che' Kidman



Contact Jack of All Games

Phone (02) 9482 7920

Online [www.poptopsoftware.com](http://www.poptopsoftware.com)

Price \$69.95

Requires Pentium II 266, Windows 95, 64M RAM

Classification G

Rating ■■■■■■■■



## Desperados: Wanted Dead or Alive

The market for tactical squad-based strategy games has recently seen a huge influx of good-quality titles. Last month, *APC* reviewed the excellent *Fallout Tactics*; the month before that, *Star Trek: Away Team*. Now Infogrames has entered the fray, taking a somewhat different tack with its Wild West-themed *Desperados*.

Set in the late 19th century in New Mexico, you assume the role of bounty hunter John Cooper. Cooper is on a mission to track down a mob of train robbers. The first few levels of the game see you rounding up your old posse, consisting of just about every clichéd character the Wild West ever saw. Each has different abilities: Cooper carries a pistol, stop-watch and knife, and is good for the silent take-down; the token African-American, Sam, is a master of explosives. There's also the rather amusingly named Doc McCoy (*Star Trek* anyone?), and three others, making six characters altogether.

The voice acting and dialogue is of mixed quality. Lines of dialogue are frequently corny and clichéd-ridden, with varying degrees of humour. Buildings and environments in cut scenes look suitably rustic, and often mirror the actual mission environments closely. However, the character rendering in cut scenes can be downright ugly.



The polished gameplay of *Desperados* makes up for what it lacks in story-line and voice acting. While it may seem somewhat simplistic at first (especially to veterans of the genre), once you get past a few levels, the tactical elements really start to take precedence. There are plenty of tight squeezes, and it's just plain fun to jump on a horse and bolt out of town with the local law enforcers shooting at you.

Missions revolve around a series of tasks that lead to your final goal, and the different party members have the key skills for getting through each level. There are 21 levels in all, and they vary considerably.



Enemy artificial intelligence is also quite acceptable — alerting one guard will often send him running to round up his comrades. Shooting your weapons in missions where you are trying to avoid detection is a big mistake, as most of your enemies will be alerted by the sound. Stealth and strategy are the main skills required, although there is the occasional explosion and gunfight to be had as well.

Gameplay can become frustrating as you attempt one strategy, only to find that things have changed drastically halfway through its execution. However, this does add to the realism in that NPCs and enemies often wander around the landscape and can make you rethink your plans rapidly — or reach for the Quick Load key.

The graphics in *Desperados* are nothing spectacular, but then again, squad-based tactical games don't usually lend themselves to flashy 3D displays. Backgrounds are well rendered, with beautifully drawn buildings and natural scenes. You can also zoom in and out of the action using the mousewheel, although the graphics become suitably blocky if you do so.

All in all, *Desperados* is a good effort from developer Spellbound. The voice acting can be annoying, and the game occasionally relies on clichés, but gameplay is polished and accessible. It's easy enough for newcomers to pick up, and has enough tactical strategy elements to satisfy even the most demanding gamer.

**Daniel Gardiner**

**Contact** OziSoft

**Phone** (02) 8303 6800

**Online** [www.desperados-us.com](http://www.desperados-us.com)

**Price** \$89.95

**Requires** Pentium II 233, Windows 95, Windows 2000, 32M RAM

**Classification** MA(15+)

**Rating** ■■■■■■■■

● In a strange turn of events, the recently released PC version of *Half-Life: Blue Shift* will not be coming to Dreamcast. The standalone episode was originally designed as an added bonus to the Dreamcast version of the game. However, shortly before *Blue Shift*'s release in the US, Sierra announced that the Dreamcast port of *Half-Life* had been completely scrapped. This is yet another painful hit for Dreamcast owners, as numerous other major titles have been scrapped after Sega's decision to abandon the console earlier this year.

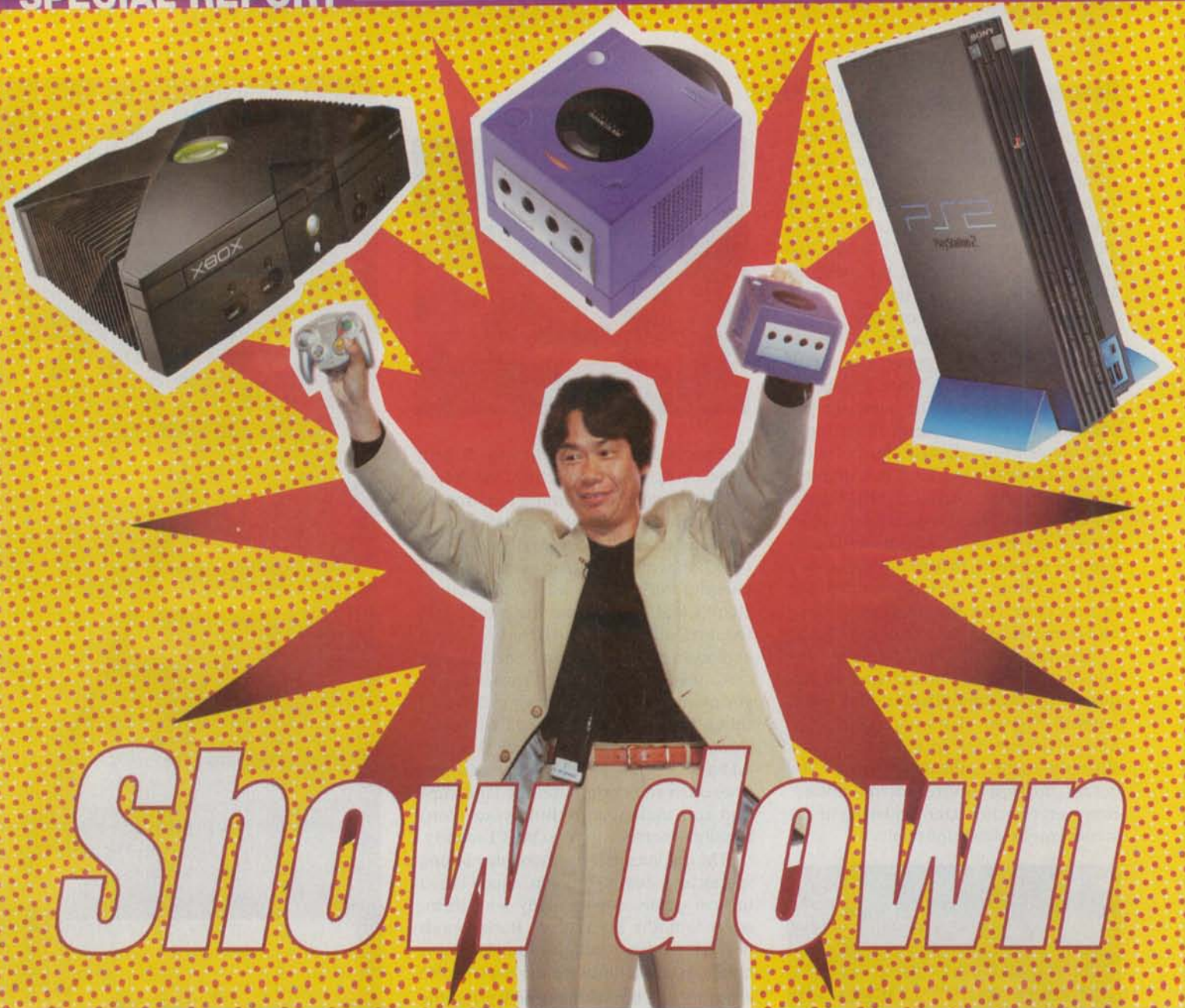


● The computer game industry constantly upgrades its copy protection methods in ongoing attempts to stay ahead of pirates. Until recently, most of the methods employed have involved simple lock-out disc authentication — if you use an illegally copied disc the game does not play. With the recent release of its military first person shooter *Operation Flashpoint*, Codemasters is trialing a new



method. Called FADE, it also relies on disc authentication, but unlike other methods it doesn't lock players out. Instead, FADE slowly degrades certain gameplay elements. As people playing with pirated discs get further into the game, gameplay mechanics break down. Over time, the game is rendered entirely unplayable. The idea behind FADE is twofold: Codemasters hopes this new protection will reduce piracy and will encourage people who like the game to buy a legitimate one.





# Show down

*This year's Electronic Entertainment Expo showcased new consoles from Nintendo and Microsoft. **Ben Hammersley** cuts through the industry hype to present a hands-on account of the proceedings.*

**L**os Angeles, Wednesday 16 May, 11am. The temperature topped 80°F, and a room full of journalists stared open-mouthed at the video screens in front of them. Shigeru Miyamoto, CEO of Nintendo and creator of Donkey Kong, Super Mario and the Legends of Zelda, had just begun demonstrating his latest game. It was a day that would decide the future of popular culture — and he won it with a silly grin.

May 16 was indeed a big day for the computer games industry. Nintendo and Microsoft unveiled their new games consoles, along with the games that will be launched to accompany them later in the

year. On the same day, Sony announced the latest changes and upgrades to its console gaming baby, the PlayStation2.

The games industry is now worth more than Hollywood — and the UK's Informa Group estimates that it will grow by 71% over the next five years, making it an \$US86 billion industry by 2006 — so the day's importance cannot be overstated. All three companies involved knew that with everyone showing their hand on the same day, they risked turning minor faults in their products into potential commercial disasters. However, a successful showing could make the world their oyster.

Even the timing of the announcements was calculated for maximum exposure — the day before the Electronic Entertainment Expo, or E3. As the world's largest and most important computer games trade show, E3 acts as a showcase for console manufacturers, as well as games designers. Its date — always mid-May — gives buyers enough time to order their Christmas stock. Anything launched later than E3 won't reach the stores before the following year, so a good showing at E3 is vital for a games studio.

Console manufacturers must also use E3 to woo developers. In such a fickle business, Sony, Nintendo and Microsoft have



to continually project an air of success if they want to prevent developers from working on rival machines. With multi-million dollar franchises such as Metal Gear Solid and Tony Hawk's Pro-Skater available to the most attractive bidder, it is important to have the hottest console at the show.

So here we had new machines from both Nintendo and Microsoft, as well as Sony desperately trying to prevent PlayStation2 being ignored amid the hype. Not surprising, then, that this year's E3 resulted in arguably the most important few days in the history of gaming, and steered the future course of the entire industry — manufacturers, developers, retailers and customers alike.

## Microsoft



A typically keen Microsoft kicked off the day at 8am. Was the early start an effort to get its news in first, or was it the desire to make the announcement in time for the afternoon's trading on the New York Stock Exchange? Microsoft didn't say. In fact, while herding 500 bleary-eyed international journalists away from the smoking corner and into a big black and green tent, Microsoft staff weren't saying much at all. The strain was showing on the minions, even as Robbie Bach, head of the Xbox project, took the stage.

"On November 8, Xbox will hit the market and redefine how people think about and play video games," he said.

Oh no. Marketing.

You could hear the thwack as a hundred hands hit a hundred foreheads, and a hundred pairs of eyes rolled to the ceiling.

"Xbox is going to change video games the way MTV changed music. Your games are never going to be the same."

Well, crikey. *But show us the games!*

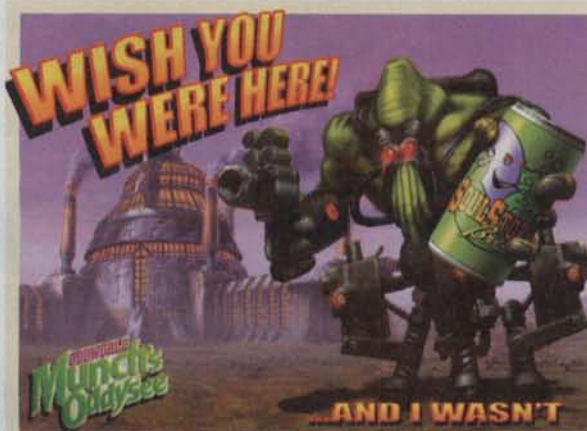
So they did. One by one developers came on stage and played a video or walked us through a level of their masterwork, and well... I hate to say it, because you know that the games you're seeing are the culmination of the blood, sweat and tears of two or three years of someone's life, but they just weren't any good. For a launch that promised to be groundbreaking and to redefine how we think, there were too many sequels, too many rehashes of old games and old ideas, and too many people talking about how powerful the Xbox is and how exciting it is to develop for.

Nothing memorable whatsoever. Even writing this a few days later, I had trouble remembering which games I saw that morning. Xbox.com tells me that of the 22 games announced so far for the Xbox, eight are sequels to games found on other platforms. Xbox's flagship game, Halo, was introduced with the words "OK, so you're a space marine fighting an alien enemy called the Covenant".

That's a new one. Never played a game like that before.

The developers came off the stage and Robbie Bach returned. According to him, the Xbox is going to be more than just a console for one player. "Online console gaming over broadband will change the face of video games forever," he said. "When the Xbox online experience goes live in the first half of 2002, our development partners will have games ready that will demonstrate how broadband online video games will have as dramatic an impact on the industry for the current generation of games as the move from 2D to 3D graphics did for the previous generation."

It comes out in the US on November 8 and will sell for \$US299. (We won't see it in Australia until March next year.) Some people clapped a little dejectedly, and everyone filed out of the tent and down the street to the Nintendo conference.



## Nintendo



Nintendo's press conference almost didn't start. The organisers made the fatal error of leaving a Gamecube in a glass box on the stage, open to view. The world and their cameras were soon clambering all over it, as a voice came over the PA pleading with them to "please, please, get off the stage!".

Nintendo's general manager, Satoru Iwata, then took to the stage and told us something we'd all been thinking, but didn't know how to express: "We see ourselves as primarily a games company," he said. "Others see themselves as technology companies. It is almost impossible to create a game that keeps up with technology. The technology you start on will certainly be outdated by the time you finish. There is not much that technology can do to impress players with pictures only."

According to Iwata, the problem with the games market is that there is "too much focus on the graphics over real entertainment; too many sequels of a few hit games; and the industry is too multiplatform." In other words, too many games run on every machine.

This was when Shigeru Miyamoto took centre stage, and everyone stood up and cheered, and he giggled, and they cheered some more. The same group of people who had been singularly unimpressed with Microsoft's multibillion-dollar project were giving a guy a standing ovation just for coming on to the stage. What was going on?

"Would you like to see the new games?" he asked.

He signalled to a guy at the back of the room, who flicked a switch, dropped the lights and played a video. Two videoscreens flashed on, bright yellow, and a movie of all our favourite characters — Mario, Pikachu, Donkey Kong, Link — all looking bigger, brighter and better than ever, started up. Every time a new character came on the screen, the crowd cheered.

And yes, the journalists cheered too.

It was like going to the cinema and seeing a new film starring all your favourite





actors — in their prime. Think Bullitt-era Steve McQueen playing opposite a thin Orson Welles. Or Bogart and Bacall as good as they ever were, against hound-dog Elvis, and a young Sean Connery.

And so it went on. Miyamoto brought out his new game, *Pikmin*, and held the crowd in thrall. He showed the latest in the Mario series, and giggled and giggled.

Iwata then returned for the serious bit: The US release date for the Gamecube will be ...

Yes? Yes?

November 5.

Three days before Microsoft!? How much? How muuuuuch?

"We'll announce the price later in the month."

Aarrrrrggh!

## Sony



Sony's turn next. It has to be said, Sony had the worst deal. We were flagging by the time we got to Sony's show. And after a morning of high drama and pretty pictures, the last thing we wanted was three hours of PowerPoint.

Consequently, it wasn't a good move to fire up the projector and walk through Sony's business plan for the next year.

Sometime in the next year, representatives said, Sony will be releasing a keyboard, mouse, screen, hard drive and operating system for the PlayStation2. Netscape is going to provide the browser and Real Networks the streaming media software and *blah* and *blah* and *blah*.

Sony, it seems, has other plans for the PlayStation2, and Ken Kutaragi, CEO of Sony's gaming division, took the opportunity to issue a statement: "Streaming media integration will vastly enrich the computer entertainment world PlayStation has built up to date," he said. "While envisioning the direct download of digital content from the network in the coming broadband era, we will obtain digital streaming and downloadable media using current networks, by integrating into PlayStation2 the world's most popular Internet media delivery client, RealPlayer. As the world of gaming and the Internet merge, so too will entertainment and communication."

Oh good.

The games they brought out that afternoon were, like the Xbox five hours before, not very memorable. Sure, they had a video of the opening sequence of *Metal Gear Solid 2*, which has been so highly anticipated that it is almost certain to be a bestseller, and a clip from *Final Fantasy X*, which again will do well, if only because it will complete fans' collections, but that was it. The rest? A dull mishmash of reshaped, if prettier, two-player beat 'em-ups, FPSes and RPGs. Yes, I'm using generic terms here — it's indicative of the impact the games made.

## Playing to win . . .

There is no doubt that the Xbox is a powerful machine. In fact, it's difficult to get Microsoft to shut up about it — stop any of the folks from the Xbox division and you'll be subjected to a tirade of polygons per second stats, and loving references to the number of simultaneous sounds their pride and joy can make. At the same time, Nintendo is pointedly quiet about its machine's measurements, but it would seem (without any form of independent testing) that the Xbox is indeed the most powerful, at least in terms of graphics.

But so what? In its continual harping on statistical advantages, Microsoft seems to be forgetting what it is making, and also revealing its roots. Extra megahertz here and there may be important for the PC market, or for enterprise computing, but gaming is different. It's the games that count, and at the Xbox preview, it soon became obvious Microsoft had missed the point.

Nintendo's press conference was altogether different. It kicked off with a riot and a standing ovation. As the show went on, it became obvious that the Gamecube's software was the big hit. Miyamoto had the philosophy spot on. With exceptional games and pricing, and the about-to-conquer-the-world GameBoy Advance,


Nintendo looks to be the strongest contender right now. For this company, E3 was a complete triumph.

In contrast, Sony is forcing the world into a bit of Kremlinology. What's going on behind company doors can only be guessed. No longer a plain gaming machine, nor a fully-fledged PC, the PlayStation2 seems to be leading Sony into creating a home-electronics hub: something to plug all of your electronics into — video camera, TV and broadband Internet connection. Combined with Sony's holdings in music, film and TV production, this makes quite a compelling product, if an expensive one.

Meanwhile, Microsoft and Sony are getting extremely excited about online gaming. The Xbox and the PlayStation2 are pushing this very hard; DSL and Ethernet adaptors, and ordinary 56K modems, are going to be available for both machines towards the end of the year.

Not so for Nintendo; company president, Hiroshi Yamauchi, told the Japanese press he wasn't up for it at all. "There is only interest in these games because NTT DoCoMo has profited from i-mode. I am not sure if content providers have made any money. Unless it proves profitable, Nintendo will not be involved in Internet games."

He may have a point. Even in the US, online gaming is still relatively rare. The broadband connections required to make it worthwhile are only slowly becoming available elsewhere, and so far, no one has proved that the obsession of a few thousand Quake III fans translates to a mass-marketable feature. Meanwhile, Nintendo has announced its pricing. In the US and Japan at least, the Gamecube will be \$US199 — \$US100 cheaper, and three days earlier, than the Xbox.

So there you go: Nintendo is taking command of the handheld, children's and family markets with characters people really want (as Iwata put it, "If you want these characters, you cannot have them if you do not have a Nintendo."), Microsoft is trying to convert the hardcore gamers, and Sony is making pricey but good-looking electronics. It could all get very interesting. 





# BLURRING THE LINE BETWEEN FANTASY AND REALITY...

The creators of the *Final Fantasy* movie reveal *The Spirits Within*.

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The team that dreamed up the *Crash Bandicoot* series are back.

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Discover three different approaches to freedom: hacking, environmental activism and creative escapism.

# Escape velocity

## The Hacker Ethic

The hacker ethic holds that you should work at something because you have a passion for it, because it is intrinsically interesting and because you want to do it as well as you can. 'Interesting' is subjective, of course; people who enjoy programming find it extremely creative, others see it as drudgery.

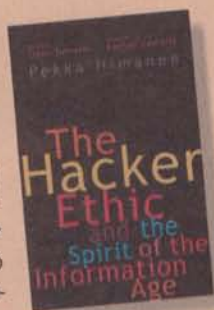
Peer recognition is another important motivator, but author Pekka Himanen points out that in the hacker community, recognition flows from passionate action directed towards an end that your fellows consider worthwhile. It isn't something sought to make up for the absence of passion and the lack of a life outside work.

However, the idea that more than a small minority of people should have a passion for what they do to earn a living sounds positively utopian. It's possible that most people seek meaning outside of work because that much passion for one thing is hard to muster; even a professional programmer might seek self-validation through leisure-time involvement in a communal development project.

The substantial epilogue by Manuel Castells has a very different flavour to the rest of the book. Himanen writes in the accessible techno-journalism style familiar from many corporate chronicles and biographies of industry figures, but Castells' style is less free-flowing.

A prologue by Linus Torvalds, copious footnotes and an extensive bibliography complete this thought-provoking volume.

**Stephen Withers**



**Author** Pekka Himanen  
**Publisher** Secker and Warburg  
**Contact** Random House  
**Phone** (02) 9954 9966  
**Price** \$35.95  
**ISBN** 0436205505  
**Rating** ■■■■■■■■

## Zodiac

Newly released in paperback, Neal Stephenson's *Zodiac* is shorter and has a simpler structure than his 1999 novel *Cryptonomicon*, but it is still an engrossing read. One of Stephenson's skills is the way he smoothly, almost imperceptibly, steps up the tempo as the plot unfolds.

The story is based on environmental activist Sangaman Taylor's efforts to uncover the source of a major PCB contamination of Boston harbour, while the company concerned tries to stop him. There's a cast of colourful environmentalists, colourless corporate types, a Native American and miscellaneous hired heavies — a small band of heroes against the establishment.

With its underwater scenes, boat chases and explosions, *Zodiac* would make a good movie. A modest amount of plot simplification would be necessary to tell the story in under two hours,



and Hollywood would probably sanitise some aspects. Our collective concern about pollution is perhaps less acute than it was a decade or so ago, but the contemporary debate about genetic engineering keeps it topical.

The 1988 copyright notice in the front of the book suggests this story had been sitting in Stephenson's bottom drawer for some time before it was published in 1998. However, it is only dated by some references to '80s musicians and 386 PCs.

**Stephen Withers**

**Author** Neal Stephenson  
**Publisher** Arrow  
**Contact** Random House  
**Phone** (02) 9954 9966  
**Price** \$19.95  
**ISBN** 0099415526  
**Rating** ■■■■■■■■

## Plowing the Dark

Adie Klarpol, a disillusioned artist, is enticed by a friend she hasn't seen for over a decade to join a special project run by a group called the Realization Lab. On a whim, she travels to the offices of TeraSys, intending to decline the work offer, but once she experiences the Cavern, she signs up immediately.

The Cavern is an early prototype of a VR environment which gives the impression of total immersion. Adie's job is to imbue the primitive graphics with details and textures so that the environments are more realistic. To do this, she urges the programmers to add physics and motion.

While the Cavern is being refined, Taimur Martin, a teacher in Lebanon, is taken hostage by religious fundamentalists. Confined to a small room and chained to a radiator for months, Taimur tries to stay sane using mental discipline. When he tires of reflecting on



his life, and on conversations, novels and movies, he begins to use his imagination to escape.

As the Tiananmen Square massacre, the collapse of the Soviet empire and the Gulf War take place, Adie's Cavern draws closer to reality and a strange connection forms between Adie's designed world and

Taimur's imagined one.

This is one of the most original, intelligent and challenging science fiction novels to have been released in years.

**Darren Ellis**

**Author** Richard Powers  
**Publisher** Random House  
**Distributor** Random House  
**Phone** (02) 9954 9966  
**Price** \$29.95  
**ISBN** 043400846X  
**Rating** ■■■■■■■■



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# Radio WWWaves

The Net is crawling with radio stations. Some are online extensions of conventional stations; others are exclusive to cyberspace. APC reviewed a cross-section of sites that stream live radio, and found the Web well worth a listen.



## 100% Funk

Take a trip back to the '60s and '70s, when such greats as James Brown, Herbie Hancock, Sly and the Family Stone, and George Clinton were the kings of funk and soul. The main feature of this French site is its 100% funk radio station, but it also has links to hundreds of other live radio stations listed by genre (alternative, dance, country and so on), as well as international Web TV stations, Webcams and MP3 sites. If you don't let a bit of French get in your way, it isn't too hard to navigate, and most of the main links are in English. And if you love to boogie down to the bass humpin' your face, this is the site for you!



Online [www.comfm.com/live/radio/funk](http://www.comfm.com/live/radio/funk)

Rating: ■■■■■■■■

Craig Carroll

## 9inety6ix.1

If you like 'nothing but '90s and new stuff', you probably already have your radio tuned in to 96.1 FM. However, did you know that you can have it streaming through your PC as well? There isn't really much that is of value on the site, but you can chat, vote for the Sanity Nightly Net 40, check the surf report and request a song. Oh, and you can also submit a photograph of yourself and find out whether you're hot... or not. If you happen to be short on company, lack confidence in your looks, and want to mail people who rate better than you in the looks stakes, I guess this site is great.



Online [www.961.com.au](http://www.961.com.au)

Rating: ■■■■■■■■

Lindsay Hayman

## BBC Radio 1

I doubt you'll come across a UK expat who didn't grow up listening to Radio 1. A live audio stream is available 24 hours per day, and the site is splitting at the seams with information on pop, alternative, urban and dance music. There's an Essentials section that covers sex, drugs, relationships, college, uni, travel, work, health and money; news of dance events in the UK and worldwide; information on artists; entertainment news; Webcams; and chat. And of course, in a country where bookmakers take bets on who'll be the Christmas No 1 chart-topper, there are the all-important singles and albums charts.



Online [www.bbc.co.uk/radio1](http://www.bbc.co.uk/radio1)

Rating: ■■■■■■■■

Lindsay Hayman

## Billboard Radio

Finding it hard to keep up with the pop charts? Head to Billboard's Net radio station, where you can hear the latest from Janet, Jennifer, Jay-Z and the gang. Billboard runs a weekly show counting down the latest from the Top 100 charts in the US. There's also an archive of past shows, and you can tune into expert chart analysis by Billboard's resident 'pop musicologist', Fred Bronson. Archived shows include a 'Special Top Twenty Diva Show!', 'The Greatest Hits Never to Make The Billboard Hot 100' and 'Best Debuts of the Rock Era'. You'll need Windows Media Player 7 to listen.



Online [www.billboardradio.com](http://www.billboardradio.com)

Rating: ■■■■■■■■

William Maher



## live-radio.net

This is the "largest directory available of working links to radio stations broadcasting live on the Internet" and has links to thousands of radio stations worldwide. Only legitimate, licensed stations that broadcast on the radio and the Internet are accepted. Every entry is flagged with the type of media that it supports, and divided into Europe, Canada, the USA and the rest



Online [www.live-radio.net](http://www.live-radio.net)

Rating: ■■■■■■■■

of the world, listed by country. The site is monitored and updated daily. It also features an excellent information section, with notes on how to connect to the radio stations, problems that may occur and how to solve them, and a list of Net-only stations. We are impressed!

Lindsay Hayman

## NewsRadio

NewsRadio is Australia's only live, national news network. It runs breaking news, sport, finance, weather and live coverage of Federal Parliament 24 hours a day, seven days a week. It features a 'rolling news' format at peak periods, so you can tune in at any point during this time and catch the top stories. The station maintains a concise



Online [www.abc.net.au/newsradio](http://www.abc.net.au/newsradio)

Rating: ■■■■■■■■

but informative Web site, which includes a finance section, providing updated stock market reports; NetNews, featuring special, in-depth reports on Internet news stories; On-the-net, listing Net links mentioned on air; and transcripts of NewsRadio's popular WordWatch section.

Lindsay Hayman

## Triple J

Just two clicks away from JJJ's main page, you can find the live-to-air version of Triple J, the ABC's youth radio network. Primarily an 'alternative' pop radio station, Triple J's music history and current affairs content has strengthened over the last decade, offering a fascinating listening experience. And if you haven't experienced Dr



Online [www.abc.net.au/triplej/triplej.htm](http://www.abc.net.au/triplej/triplej.htm)

Rating: ■■■■■■■■

Karl Kruszelnicki's weekly science Q&A spot, 'Great Moments In Science', you just haven't lived. The rest of the site provides the usual self-promoting and administrative fare. The JJJ site is also community-savvy, and has forums that give listeners a space to discuss the many issues covered 'on the air'.

March Stepnik

## MEDIAmazing

The vast amount of screen space that MEDIAmazing devotes to advertising is certainly amazing. To access the database of popular music you must disclose a contact address, along with your age and gender — supposedly so you can set your own preferences. The range of music spans top 40 hits since the '70s, traditional jazz and classical. There's even a 'spoken word'



Online [www.mediamazing.com](http://www.mediamazing.com)

Rating: ■■■■■■■■

option if you are in need of a good talking-to by an obscure American relationship or religious guru. The site can be viewed in five languages, but the music is mostly US-oriented (however, like many broad-minded US sites, there is a 'world music' option).

Fiona Angus

## Technobroadcast.com

With 22 different styles of techno, this Web radio station has something for everyone (as long as you like techno). The understated design makes the site easy to navigate, but it is a little dull. You can join the artists' community and provide tracks of your own for broadcasting on the site (these are



Online [www.technobroadcast.com](http://www.technobroadcast.com)

Rating: ■■■■■■■■

reviewed prior to posting). You can also buy CDs (compilations and single artist releases) for between \$10 and \$12. There is a top 10 tracks listing and a page of links. You even get this advice: "Don't think about what you are; just think about what you are doing."

Suzanne Fraser

## TwangCast

This country music Web station promises listeners a satisfying combination of new releases, classics and independent artists not found on Top 40 country music stations. It's bright and cheerful in a country sort of way, and there are (not always well-written) reviews of new CDs, as well as links to related



Online [www.twangcast.com](http://www.twangcast.com)

Rating: ■■■■■■■■

sites, and country music news on topics such as CD release dates and country music showbiz events. A helpful display at the bottom of the page tells you which track is playing. The site is undergoing a redesign, so some sections aren't working at present.

Suzanne Fraser



# Lara's legacy

While the Tomb Raider movie rakes in more money than it probably should, it looks like the golden age of game and movie crossovers is upon us. Always one to jump on the bandwagon, Chip Chat has come up with some winning suggestions for games that should be made into movies, and movies that should be made into games.

## Games that should be made into movies

### Leisure Suit Larry — romantic drama



The success of *Bridget Jones's Diary* has shown that the world loves movies based on the travails of cute, sassy women as they try to find love in this crazy, modern world. Now comes *Leisure Suit Larry*, a movie for the sensitive man. Sartorially challenged Larry just can't seem to find the right

woman. Follow his zany exploits from strip bar to strip bar. Will getting a woman drunk help his chances, or should he try one of his special 'jokes'? Soundtrack by the *Funniest Home Videos* team.

### Pro Bass Fishing — action/adventure

Fishing has never been more action-packed! The movie stars Dolph Lundgren as John Duggan, a tough-as-nails divorced cop with an adoring child, who heads out fishing only three weeks from retirement. It's non-stop action as Duggan debates which lure, line and rod to use. We won't give away the climax, but when his float starts jiggling, you'll be waiting with 'baited' breath to find out whether it's a log, shoe or trophy bass on the hook.



### Chu Chu Rockets — documentary

A gritty, sometimes moving look at the startling world behind the Chu Chu Rockets phenomenon. Cats, rockets and mice collide in this frank, black-and-white documentary. The movie answers some important questions, such as why the cats are so intent on eating the mice and how

the mice found out about the rockets. Unfortunately, it ends before you can find out where the mice are being flown to.



## Caption contest!

APC has a cupboard full of stuff to get rid of, including hardware and software. To win a mystery prize of dubious value, send the funniest caption you can think of for the picture on the left to [captions@acptech.net](mailto:captions@acptech.net).

June's (see right) winners were Peter and Melinda Arrighi, who suggested "Technology doesn't discriminate; it confuses everyone". Thanks to everyone who sent in an entry.



## Movies that should be made into games

### Driving Miss Daisy — racing game



This erratic racer sees you rushing from location to location in an attempt to cater to Miss Daisy's needs. Authentic voice-overs from stars Morgan Freeman and Jessica Tandy give the game added realism — Freeman constantly mutters and swears under his breath, while a psychotic Tandy belts a constant stream of curses into the player's left ear.

### Cast Away — Quake-style first person shooter

Stranded alone on a desert island, your brief is to fill Tom Hanks's shoes (or rags) and pursue two objectives: survival and preservation of your sanity. This ingenious title accurately simulates the thrills of hitting trees with a spear to get coconuts, and breaking coconuts open with large stones. Spend hours aimlessly wandering around the deserted island — multiplayer allows you to choose between two characters: the spear-wielding Hanks and an immobile volleyball named Wilson.



### Fear and Loathing in Las Vegas — adventure game/management sim



Placed in the role of a drug-addled journalist, you must wander Las Vegas, talking to its inhabitants in an attempt to find a story. There's one catch — you must do so without letting members of the resident cop convention or the hotel management know what you're up to. This task is made even harder by the fact that you must regularly mix concoctions from your 'little black bag' to keep your Samoan lawyer sidekick from flipping out.



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